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SKANTI

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APP 754

INSTRUCTION MANUAL

MARINETTA TRP 1

PORTABLE SURVIVAL RADIO

MARINETTA

TRP 1

INSTRUCTION MANUAL

CONTENTS

		Page
	TECHNICAL DATA	
1.	INTRODUCTION	1-1
2.	TECHNICAL DESCRIPTION	2-1
	2.1 Mechanical	2-1
	2.2 General Circuit Description	2-1
	2.3 Individual Circuits	2-2
3.	INSTALLATION	3-1
4.	OPERATION	4-1
	4.1 Transmission of Automatic Distress Signal	4-1
	4.2 Manual Operation	4-2
	4.3 Testing	4-3
5.	MAINTENANCE	5-1
	5.1 Dryer	5-1
	5.2 Snap Fasteners	5-1
6.	REPAIR AND ALIGNMENT	6-1
	6.1 Introduction	6-1
	6.2 Cross-slot Screws	6-1
	6.3 Locating Subunits and Components	6-1
	6.4 Locating Faults	6-1
	6.5 AC Voltages	6-1
	6.6 DC Voltages	6-1
	6.7 Adjustments	6-1
	6.8 ⟨103⟩ Realignment of Two-tone Generator	6-2
	6.9 ⟨104⟩ Realignment of Driver	6-2
	6.10 ⟨110⟩ Realignment of Receiver	6-4
	6.11 ⟨116⟩ Realignment of Voltage Regulator +5V	6-7
	6.12 ⟨117⟩ Realignment of Voltage Regulator +20V	6-7
	6.13 Generator Unit	6-7
7.	PARTS LISTS AND CIRCUITS DIAGRAMS	7-1
	7.1 Numbering	7-1
	7.2 Switches	7-1
	7.3 Terminals	7-1
	7.4 Voltages	7-1
	7.5 Test Points	7-1
	7.6 Abbreviations	7-2
	7.7 Parts Lists	7-3
	7.8 Diagrams	7-16

Technical Data

Transmitter:

	500 kHz	2182 kHz	8364 kHz
Transmit frequencies:			
Frequency stability:	500 ppm	50 ppm	50 ppm
Wave type:	A2	A3	A2
Modulation frequency:	500 Hz	-	500 Hz
Frequency range:	-	300-3000 Hz	-
Modulation percentage:	100	85-100	100
Power output (depending on antenna):	1.5-3.5 W	2.0-3.5 W	2.0-3.5 W

Automatic transmission: For use on 500 and 8364 kHz the set incorporates an automatic keying device for transmission of the radiotelegraph alarm signal, SOS, and DF-dashes.

For use on 2182 kHz, a built-in two-tone generator provides automatic transmission of the radiotelephone alarm signal.

Receiver:

	500 kHz	2182 kHz	8364 kHz
Receive frequency:			
Wave types:	A2	A3	A1, A2, A3
Sensitivity (1mW, 15dB SINAD):	35 dB/1uV	30 dB/1uV	30 dB/1uV
Image rejection:	-	60 dB	20 dB
IF breakthrough rejection:	-	60 dB	60 dB
Spurious response rejection:	50 dB	50 dB	-

Selectivity:

±5 kHz:	Less than 6 dB
±8 kHz:	More than 6 dB
±30 kHz:	More than 40 dB
±100 kHz:	More than 60 dB

Power supply: Built-in hand-cranked generator.
Provision for operation from external power supply (24V accumulator battery), power consumption 25W at 24V. Nominal Voltage 26V.
Provision for operation from external dry battery, power consumption 20W at 21V.

Antennas: 7 m telescopic whip.

10 m wire antenna.

A 26 m kite antenna is available as an extra accessory.

Weight:	Approx. 17 kg
Dimensions:	Packed:
	Length: 544 mm
	Width: 244 mm
	Height: 280 mm
	Ready for Operation:
	Length: 544 mm
	Width: 244 mm
	Height: 210 mm

1. INTRODUCTION

The Marinetta TRP 1 is a portable transmitter/receiver specifically designed for use on board survival crafts of every type.

The Marinetta TRP 1 is a three-frequency set with which two-way communication can be established on each of the three international distress frequencies: 500 kHz, 2182 kHz and 8364 kHz.

Great importance has been attached to simplicity of operation so that also unskilled persons will be able to operate the set. It has provision for automatic transmission of alarm signals, SOS and DF-signals on 500 kHz and 8364 kHz and two-tone alarm signals on 2182 kHz.

The set is very ruggedly built to withstand mechanical influences of the kind that may be expected in emergencies.

Electrically, the very latest technology is used. The set is fully transistorized, and integrated circuits are widely used. Also, high-quality components are used throughout in order to secure the greatest possible reliability.

Because we are constantly processing the experience gained during the production and operation of our equipment it is possible for minor modifications to occur, differing from the information given in this instruction manual. If practically possible, however, any corrections will be listed on a separate sheet on the back of the front cover of this manual.

2.1. Mechanical

The set is built on a rugged alodine-treated aluminium chassis consisting of an intermediate front panel and two side walls.

The electrical circuitry is built on a total of seven circuit boards, all of which except for the voltage regulator units are mounted on the aluminium chassis. The transmitter antenna tuning circuit is located in the space between the side walls.

The aluminium chassis with the generator and voltage regulator is mounted on a rugged cast silumin front panel. The front panel is secured to a rugged glass-fibre case with a lid in which the crank, antennas and other accessories are placed.

2.2. General Circuit Description

Diagrams for the set comprise a wiring diagram showing all interconnections, a block diagram, and circuit diagrams of individual modules.

2.2.1. Transmitter

2.2.1.1. All RF signals for the transmitter circuit are generated on modules 102 and 104.

The RF-signal generator, 102, contains two crystal oscillators operating on 2182 kHz and 2000 kHz, respectively.

From the 2000-kHz signal, a chain of dividers produce signals of 500 kHz and a number of other frequencies for use in the various circuits. The driver 104 contains a crystal oscillator for 8364 kHz.

2.2.1.2. The transmission frequencies are fed to the driver circuit board 104, where it is modulated and stepped up by a Class C amplifier. From the driver amplifier, the signal is fed to the output amplifier, which is series-modulated Class C power amplifier.

On 500 kHz and 2182 kHz, antenna tuning is performed with variometers, on 8364 kHz with a variable capacitor.

2.2.1.3. Modulating signals for the driver and series modulator are taken from module 103, which contains a two-tone generator and audio amplifier. Input signal for 103 is determined by S1, FREQUENCY/ANTENNA and S2, FUNCTION: on 500 kHz and 8364 kHz it is a 500 Hz squarewave signal, while it on 2182 kHz is either a signal from the microphone or the two-tone alarm signal.

2.2.1.4. The automatic keying device, 101, incorporates three sequential networks which on the basis of a 10 Hz signal generate the alarm sequence to be used in automatic transmission on 500 kHz and 8364 kHz.

2.2.1.5. Power module 116 contains a switch regulator for generating supply voltage for the integrated circuits, and the circuits for the Speed Indicator and the Morse Alarm Indicator.

2.2.1.6. Power module 117 contains a rectifier and a self-oscillating switch regulator for the handcranked AC-generator.

2.2.2. Receiver

The receiver, 110, uses as its nucleus an integrated circuit containing all necessary active elements. On 500 kHz it is a straight ("TRF") receiver whilst on 2182 kHz and 8364 kHz it is a single-conversion superhet whose intermediate frequency is 500 kHz.

2.3. Individual Circuits

101 Automatic Keying Device

As appears from the block diagram on page 6-17, the automatic keying device is composed of three generators which provide the alarm signal, SOS signal and DF-signal, respectively. These three generators are controlled by a starting and control circuit.

All generators are based on the same principle: A binary chain of flip-flops count on the basis of a 10 Hz input signal up to a number corresponding to the number of bits in the wanted signal. The outputs of this counter are connected to a combinatory network which, for each of the binary input figures, provide a logic 0 or 1 at the output in accordance with the wanted signal.

The start and control circuit ensures both that signals are generated in the correct sequence and that the generators are started and stopped synchronously with the 10 Hz input signal so that also the first and last elements of the character sequence will be ensured the correct length. Integrated TTL circuits are employed.

102 Frequency Generator

This circuit consists of two crystal oscillators and a chain of dividers.

2 NAND gates in 102IC9 are connected to operate as a crystal oscillator on 2182 kHz. A similar 2000 kHz oscillator uses two NAND gates from 102IC8. The 2000 kHz signal from this oscillator is fed to a dividing chain composed of seven integrated ten-dividers, 102IC1 - 102IC7. From this chain, the following signals are taken off: 500 kHz, 25 kHz, 500 Hz, 10 Hz and 2 Hz, for use in various placed in the transmitter. Three of the remaining NAND gates are used for a keying circuit which connects the automatic keying device and the morse key in parallel and generates a keying signal for the driver 104 and a keyed 500 kHz signal for the A2 modulation. The last NAND gate together with 102D1 and 102TR1 constitute a reset circuit for resetting the automatic keying device when power is applied to the set.

103 Modulator

The modulator consists of a two-tone generator and audio amplifier.

103TR6 and 103TR7 constitute two LC oscillators tuned to 1300 Hz and 2200 Hz, respectively. A 2 Hz square-wave signal from 102 controls

the two oscillators so that they operate in alternate periods of 250 msec. each.

103TR3, 4, 5 and 8 constitute a DC-coupled audio amplifier using a differential input stage. This amplifier controls a chassis-mounted power transistor, 109TR4, which is connected in series with the collector of the RF output transistor, 109TR5, thus modulating the supply voltage of the latter transistor.

On 500 kHz and 8364 kHz the input signal is a 500 kHz square-wave signal which overdrives the amplifier heavily so that 109TR5 is modulated 100% with a square-wave signal. On 2182 kHz the input signal is either a signal from the microphone or a signal from the two-tone amplifier. Under conditions of full drive a modulation signal is obtained which has a peak-to-peak voltage that is very nearly equal to the supply voltage, due to the fact that 103TR4 is bootstrapped to 103C6. Overdriving results in symmetrical clipping in view of the fact that the no-signal voltage at terminal 103-3 is half the supply voltage.

104 Driver

The driver is composed of a modulator, a class C amplifier and a crystal oscillator for 8364 kHz.

The modulator consists of TR4 and TR5. The signal frequency is applied to the base of TR4, while the modulating signal is applied to the base of TR5, which is connected in series with the emitter of TR4. The modulated RF-signal is taken from the secondary of T1 and applied to the transformer coupled class C amplifier TR6, which drives the output transistor. D2 and its associated components protects the base of the output transistor against excessive voltages.

TR1 and its associated components constitute a crystal oscillator which operates on 8364 kHz, while TR2 acts as a buffer between the oscillator and the modulator. Finally, TR3 acts as a keying transistor, removing the drive to TR4 in accordance with the keying signal from 102 .

Resistors R10, R23, R33 and R22 make it possible to adjust the output power on 8364 kHz, 2182 kHz and 500 kHz, respectively, Resistor R18 is used to adjust the modulation depth on 2182 kHz.

109 Chassis-mounted Components

Chassis-mounted components are mainly the RF output transistor with its associated antenna tuning unit.

The output transistor is a VHF power transistor which operates in Class C on all three frequencies. On 500 kHz and 2182 kHz, antenna tuning is carried out with variometers. Here it is possible to select a shortening capacitor with S1 so that both short and long antennas can be tuned. On 8364 kHz, tuning is performed with a variable capacitor in series with a fixed loading coil.

Antenna current is fed through a current transformer, 109L5; from it a signal is taken off which is rectified and fed to tuning indicator 109ME1.

110 Receiver

This circuit consists of a complete receiver for 500 kHz, 2182 kHz and 8364 kHz.

110IC1 is an integrated circuit containing all the active elements of the receiver: RF amplifier, mixer, IF amplifier, detector, beat oscillator, AGC amplifier and audio amplifier.

On 500 kHz, the circuit operates as a straight ("TRF") receiver in which selectivity is obtained with the preselector circuit 110T3 and with the 500 kHz filter composed of 110L3 to 110L7 with associated capacitors.

On 2182 kHz the circuit operates as a fixed-tuned single-conversion superhet whose intermediate frequency is 500 kHz. The signal frequency is fed via preselector circuits 110T2 and 110T5 to the mixer, where the IF signal is generated by means of a crystal-controlled injection signal at 2682 kHz.

On 8364 kHz, the circuit operates as a continuously tunable single-conversion superhet. The signal frequency is fed to the mixer via preselector circuits 110T1 and 110T4. The injection signal is generated in an LC oscillator whose frequency is determined by 110T7, 110C23 and capacitance diode 110D9, whose voltage is controlled by potentiometer 109R3. On 8364 kHz there is also provision for reception of A1 by means of a beat oscillator operating at 501 kHz; the frequency-determining components in this case are 110L8 and 110C31.

The injection signals and beat oscillator are controlled by diodes 110D7, 110D8 and 110D10. The input circuits of the receiver are protected against large signal voltages by neon lamp 110SL1 and diodes 110D1 to 110D6.

116 Voltage Regulator + 5V

The voltage regulator contains a switch regulator to stabilize the supply voltage for the integrated circuits.

116IC1 is an integrated voltage stabilizer, in this case operated as a switch regulator providing an output voltage of 5V; the switch frequency is 25 kHz. When S2 is in the Receive position, 116IC1 operates as a series regulator, the 25-kHz signal being removed. This arrangement prevents the receiver from picking up noise.

The speed indicator diode is inserted in series with the collector of 116TR4, which is connected to 116TR3 in a differential circuit. When the supply voltage exceeds approx. 19V, 116TR4 goes on, causing the light-emitting diode to light up.

The automatic-keying-device indicator is connected in series with the collector of 116TR5.

117 Voltage Regulator +20V

Power module 117 contains a rectifier and a circuit to stabilize the voltage from the built-in handcranked AC-generator.

The stabilizing circuit is in this case a selfoscillating switch regulator. The oscillator circuit consists of TR4 and TR6, operating as an emitter-coupled multivibrator; the output from this is integrated and applied to the switch circuit. The switch circuit consists of TR2 and TR3 which are operated as a Schmitt trigger. The base of TR2 is coupled to the oscillator, while the base of TR3 is coupled to a DC-voltage proportional to the output voltage. In this way, the output signal from the Schmitt trigger becomes a square-wave signal, in which the pulse width varies inverse proportional to the input voltage in such a way that the mean value is exactly 21V. The square-wave signal drives the chassis-mounted output transistor 109TR6, which is connected in a Darlington coupling to TR1. Finally, the square-wave voltage is filtered in the low-pass filter 109L7 and C13.

If an external 24V-battery is used, this voltage is also stabilized by the switch regulator. The battery voltage is applied through diode D4, which protects the equipment against reverse polarity.

The whole unit is contained in a metal can in order to prevent the receiver from picking up noise.

3.1. The set is watertight and will float. It can be lowered into water using a 25 m nylon line which is secured to the case. In a situation of extreme emergency the set may be thrown into the water. It will stand being thrown from heights up to 20 metres.

3.2. Getting Ready

(1) Uncoil line.

(2) Remove lid. To do this, release the six snap fasteners.

(3) Remove foam rubber cushion inside the lid and take out antennas and cranks.

(4) Raise one of the antennas as high and in the clear as possible.

In the dinghy, use the whip. In mast-equipped lifeboats use the wire antenna, otherwise the whip. As an extra accessory, approx. 26 metres of kite antenna may be supplied which may be used in both lifeboats and dinghies. Closely follow instructions for the respective antennas. Keep antenna clear of sails, stays etc.

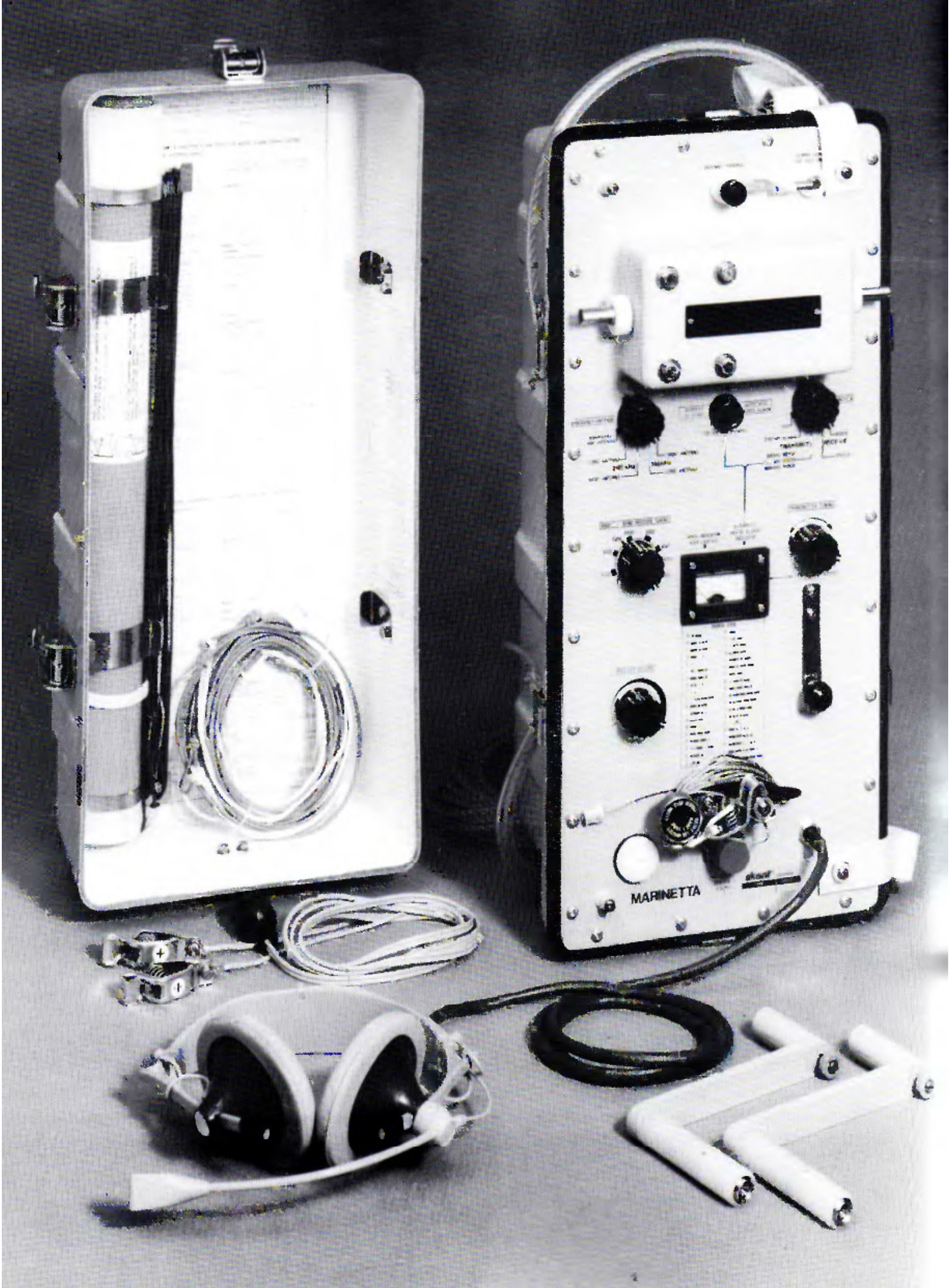
(5) Mount cranks.

(6) Secure the set to a thwart or to the operator, using the straps.

(7) Connect antenna cable eye at ANTENNA TERMINAL on set.

(8) Release the earth wire and sinker and throw the sinker into the water.

(9) Put on headphones.


MARINETTA

4.1. Transmission of Automatic Distress Signals

4.1.1. 500 kHz:

4.1.1.1. Set FUNCTION to TRANSMIT 500 kHz MORSE

4.1.1.2. Turn cranks so that SPEED INDICATOR lights.

4.1.1.3. With FREQUENCY/ANTENNA first set to 500 kHz SHORT ANTENNA and thereafter to 500 kHz LONG ANTENNA, press MORSE KEY and adjust TRANSMITTER TUNING for maximum meter reading; if a reading is obtained for both FREQUENCY/ANTENNA settings, use the setting giving maximum reading.

4.1.1.4. Release MORSE KEY and depress DEPRESS TO START AUTOMATIC MORSE ALARM. This will start automatic transmission.

4.1.1.5. During transmission, the AUTOMATIC MORSE ALARM INDICATOR will show light, and the meter needle will deflect in time with the transmitted signals. These will also be heard in the headphones. When the AUTOMATIC MORSE ALARM INDICATOR stops showing light it is an indication that the transmission has ended, and DEPRESS TO START AUTOMATIC MORSE ALARM must be operated again to transmit another signal. During transmission, the cranks must constantly be turned at such a speed that the SPEED INDICATOR lights. If the speed is reduced to the point where the SPEED INDICATOR goes out, automatic transmission will stop, and DEPRESS TO START AUTOMATIC MORSE ALARM must be operated once more after the SPEED INDICATOR has again been made to show light, which will cause automatic transmission to start from the beginning.

4.1.2. 2182 kHz:

4.1.2.1. Set FUNCTION to TRANSMIT 2182 kHz ALARM.

4.1.2.2. Turn cranks so that SPEED INDICATOR lights.

4.1.2.3. With FREQUENCY/ANTENNA first set to 2182 kHz SHORT ANTENNA and thereafter to 2182 kHz LONG ANTENNA adjust TRANSMITTER TUNING for maximum meter reading. If a reading is obtained at both FREQUENCY/ANTENNA settings, use the setting giving maximum reading.

4.1.2.4. During transmission the two-tone alarm signal can be heard in the headphones.

4.1.3. 8364 kHz:

4.1.3.1. Set FUNCTION to TRANSMIT 8364 kHz MORSE.

4.1.3.2. Set FREQUENCY/ANTENNA to 8364 kHz ANY ANTENNA.

4.1.3.3. Turn cranks so that SPEED INDICATOR lights.

4.1.3.4. Depress MORSE KEY and adjust TRANSMITTER TUNING for maximum meter reading.

4.1.3.5. Release [MORSE KEY] and press [DEPRESS TO START AUTOMATIC MORSE ALARM], thus causing automatic transmission to start. See also 4.1.1.5.

4.1.4. General:

When using automatic transmission it is advisable to switch between 500, 2182 and 8364 kHz, transmitting for three to five minutes on each frequency.

Use the international silent periods especially intended for the transmission of automatic distress signals:

Transmit for at least 3 minutes on

500 kHz, beginning every fifteenth minute after each full and half hour.

2182 kHz, beginning every full and half hour.

4.2. Manual Operation

4.2.1. Transmit:

4.2.1.1. 500 kHz and 8364 kHz

Set up transmitter as described under 4.1.1.1. to 4.1.1.3. and 4.1.3.2. to 4.1.3.4., respectively.

Use [MORSE KEY] to transmit wanted signal.

4.2.1.2. 2182 kHz:

Set [FUNCTION] to TRANSMIT 2182 kHz SPEECH.

Set up transmitter as described under 4.1.2.2. and 4.1.2.3. Speak loudly and distinctly into the microphone, touching the microphone with your lips.

4.2.2. Receive:

4.2.2.1. 500 kHz and 2182 kHz:

Set [FUNCTION] to RECEIVE SPEECH.

Set [FREQUENCY/ANTENNA] to one of the 500 kHz positions (it does not matter which one) for reception on 500 kHz and to one of the 2182 kHz positions (it does not matter which one) for reception on 2182 kHz.

Turn cranks so that SPEED INDICATOR lights.

Adjust for convenient volume, using [RECEIVER VOLUME].

4.2.2.2. 8364 kHz:

Set [FUNCTION] to the RECEIVE SPEECH or RECEIVE MORSE position, as required.

Set [FREQUENCY/ANTENNA] to the 8364 kHz ANY ANTENNA position.

Turn cranks so that SPEED INDICATOR lights

Select the wanted receive frequency with [8000 kHz BAND RECEIVER TUNING].

Adjust for convenient volume, using [RECEIVER VOLUME].

4.3. Testing:

4.3.1. To test the equipment with an antenna connected to it, set the controls as described under 4.2. above. NOTE: Never transmit a two-tone alarm signal or morse alarm during testing.

4.3.2. With [FUNCTION] in the TEST position the two-tone alarm and morse alarm may be tested without generating a high-frequency signal.

With [FREQUENCY/ANTENNA] in the 2182 kHz position the two-tone alarm signal will be heard in the headphones.

With [FREQUENCY/ANTENNA] in the 500 kHz or 8364 kHz position the morse alarm signal will be heard in the headphones after [DEPRESS TO START AUTOMATIC MORSE ALARM] has been operated.

4.3.3. If also the high-frequency section of the transmitter is to be tested without using an antenna, the built-in dummy antenna may be used. The spring-loaded cable eye from DUMMY LOAD should be connected to ANTENNA TERMINAL and the transmitter adjusted as described under 4.1. - 4.2. above.

5.1. Dryer

The dryer becomes accessible by removing the screw located in the lower left corner of the front panel, using a coin or large screwdriver.

On the screw is mounted a clear plastic cartridge containing silica gel. This substance is moisture absorbent and possesses the property of changing its colour from blue to pink if saturated with moisture. If this is the case, the dryer must be dried until the colour is again blue, or it must be exchanged.

5.2. Snap Fasteners

The snap fasteners should be checked at frequent intervals.

In order to ensure watertightness the rubber gasket under the front panel should be under uniform light pressure. This is accomplished by adjusting the pull-hook in the snap fastener after having loosened the lock nut.

6. REPAIR AND ALIGNMENT

6.1. Introduction

Repairs and adjustments on the equipment should be performed only by qualified technicians, to whom this chapter is addressed. Before attempting any repairs or adjustments a study of chapter 2, Technical Description, is recommended.

6.2. Cross-slot Screws

The cross-slot screws used are Pozidriv screws. A Pozidriv screwdriver No. 2 for the frontpanel and No. 1 for all other screws should be used in order to avoid damaging the screws.

6.3. Locating Subunits and Components

Location of circuit boards in the equipment appears from the drawing on page 7-15. Location of components on each circuit appears from the component location drawings against the respective circuit diagrams.

6.4. Locating Faults

Fault finding is aided by the solder terminals, which may to a great extent be regarded as test points. Typical voltages are listed against relevant solder terminals on the circuit diagrams, and likewise, typical voltages are listed at relevant points in the circuits.

If a measured voltage differs markedly from the listed voltage it is a fairly certain indication that the circuit board in question is faulty, assuming that the voltages applied to the circuit board are the correct ones. This should likewise be checked.

6.5. AC Voltages

AC voltages listed in the diagrams are typical voltages. Voltages specified in the transmitter and power supply sections of the equipment are based on measurement with an oscilloscope having an input impedance of 10 Mohms in parallel with 7 pF, a sensitivity in the order of 50 mV/div and a frequency range of not less than DC - 25 MHz.

In the receiver part the specified voltages are based on measurement with an RF millivoltmeter having an input impedance of 20 kohms in parallel with 5 pF, a sensitivity in the order of 10 mV f.s.d. and a frequency range of not less than 0,5 - 10 MHz.

6.6. DC Voltages

DC voltages listed in the circuit diagrams are based on measurement with a 25 kohm/volt multimeter. If a stated voltage is dependent on the setting of a control, this is also stated on the circuit diagrams.

6.7. Adjustments

This section describes alignment procedures for each individual module that contains adjustable components. Keep in mind that no adjustment should be carried out unless there is a clear indication that this is necessary. Moreover, adjustments should be carried out only by a qualified technician with the necessary equipment at his disposal.

6.8. △103 Realignment of Two-tone Generator

Measuring equipment:

Frequency counter having an accuracy better than 10^{-4} and a sensitivity of at least 100 mV.

Transmitter settings:

FREQUENCY/ANTENNA : 2182 kHz SHORT/LONG ANTENNA

FUNCTION : TEST

(1) Connect frequency counter between terminals 3 and 1.

(2) Disconnect the wire to terminal 10.

(3) Connect terminal 10 to terminal 9.

(4) Adjust coil T2 (colour coded red/red) until counter reads 2200 Hz ±1Hz.

(5) Remove connection referred to under (3) above.

(6) Connect terminal 10 to terminal 11.

(7) Adjust coil T1 (colour coded brown/orange) until counter reads 1300 Hz ± 1 Hz.

(8) Remove connection referred to under (6) above.

(9) Reconnect wire referred to under (2) above.

6.9. △104 Realignment of Driver

Measuring equipment:

Oscilloscope, input impedance 10 Mohms in parallel with 7 pF or better.

Dummy antennas:

15 ohms in series with 70 pF
30 ohms in series with 400 pF
40 ohms

NOTE: Before carrying out the following procedures, it is essential to be sure that the dummy antennas have the values stated above. This can only be checked by measuring the dummy antennas on an RF impedance-bridge.

A. Modulation depth on 2182 kHz.

Transmitter settings:

FREQUENCY/ANTENNA : 2182 kHz SHORT ANTENNA

FUNCTION : TRANSMIT 2182 kHz ALARM

Dummy antenna:

15 ohms in series with 70 pF.

(1) Connect oscilloscope across the resistor in the dummy antenna.

(2) Adjust transmitter to maximum voltage on oscilloscope.

(3) Adjust R18 until modulation percentage is 80% ± 3%.

B. Output power on 2182 kHz LONG ANTENNA.

Transmitter settings:

[FREQUENCY/ANTENNA] : 2182 kHz LONG ANTENNA

[FUNCTION] : TRANSMIT 2182 kHz SPEECH

Dummy antenna:

30 ohms in series with 400 pF.

(1) Adjust R23 until output power is 4,0 W $^{+0,1}_{-0}$ W.

NOTE: If the value of R23 is changed, it may also be necessary to realign the output power in short antennas as described under C beneath.

C. Output power on 2182 kHz SHORT ANTENNA.

Transmitter settings:

[FREQUENCY/ANTENNA] : 2182 kHz SHORT ANTENNA

[FUNCTION] : TRANSMIT 2182 kHz SPEECH.

Dummy antenna:

15 ohms in series with 70 pF.

(1) Adjust R33 until output power is 2,0 W $^{+0,1}_{-0}$ W.

D. Output Power on 500 kHz.

Transmitter settings:

[FREQUENCY/ANTENNA] : 500 kHz SHORT ANTENNA.

[FUNCTION] : TRANSMIT 500 kHz MORSE.

Dummy antenna:

15 ohms in series with 70 pF.

(1) Adjust R22 until output power is 1,5 $^{+0,1}_{-0}$ W

NOTE: If the value of R22 is changed, it may also be necessary to realign the output power on 2182 kHz as described under B. and C. above.

E. Output power on 8364 kHz.

Transmitter settings:

[FREQUENCY/ANTENNA] : 8364 kHz ANY ANTENNA.

[FUNCTION] : TRANSMIT 8364 kHz MORSE.

Dummy antenna: 40 ohms.

(1) Adjust R10 until output power is 4.5 W $^{+0,1}_{-0}$ W

6.10. ⚠110⚠ Realignment of Receiver

On the receiver board, realignment and faultfinding is aided by 4 test points, located different places in the circuit. They are small pin-type terminals, ring colour coded following the standard colour code in addition to being numbered. In the circuit diagram, the test points are marked [TP1] , [TP2] etc.

Measuring equipment:

Standard signal generator, covering 500 kHz, 2182 kHz and 8200-8800 kHz. Output impedance on 500 kHz. Output impedance on 500 kHz and 2182 kHz: 15 ohms in series with 150 pF. On 8200-8800 kHz: 50 ohms.

RF millivoltmeter having a sensitivity of 10 mV f.s.d., input impedance better than 20 kohms in parallel with 5 pF.

A. 500 kHz

Receiver settings:

[FREQUENCY/ANTENNA]: 500 kHz SHORT/LONG ANTENNA.

[FUNCTION]: RECEIVE SPEECH.

(1) Connect signal generator (Rg = 15 ohms + 150 pF) to antenna socket and RF millivoltmeter between [TP1] and ground.

(2) Set signal generator to 499,5 kHz $\pm$ 0,1 kHz and 300 uV (e.m.f.).

(3) Adjust coil T3 to maximum voltmeter reading.

(4) Short-circuit coil L4 and adjust coil L3 to maximum voltmeter reading.

(5) Transfer short-circuit to coil L5 and adjust coil L4 to minimum voltmeter reading.

(6) Transfer short-circuit to coil L6 and adjust coil L5 to maximum voltmeter reading.

(7) Transfer short-circuit to coil L7 and adjust coil L6 to minimum voltmeter reading.

(8) Transfer short-circuit to [TP3] (and ground) and adjust coil L7 to maximum voltmeter reading.

(9) Disconnect the RF millivoltmeter and turn the adjustor of coil L3 1/8 of a turn into the coilform.

(10) Connect the RF millivoltmeter between the junction of C20 and C21 and ground and check that the 6 dB band limits is below and above 495 kHz and 505 kHz, respectively.

(11) Disconnect the RF millivoltmeter and remove the short circuit from [TP3].

B. 2182 kHz

Receiver settings:

[FREQUENCY/ANTENNA]: 2182 kHz SHORT/LONG

[FUNCTION]: RECEIVE SPEECH

(1) Connect RF millivoltmeter between [TP2] and ground.

(2) Adjust oscillator coil T6 to maximum voltage.

(3) Connect the RF millivoltmeter between the junction of choke L1 and coil T2 and ground.

(4) Set signal generator (Rg = 15 ohms + 150 pF) to 2182 kHz $\pm$ 0,5 kHz and 10 mV (e.m.f.).

(5) Detune coil T5 by turning the core outwards.

(6) Adjust coil T2 to maximum voltmeter reading.

(7) Adjust coil T5 to minimum voltmeter reading.

C. 8 MHz band

Receiver settings:

[FREQUENCY/ANTENNA]: 8364 kHz ANY ANTENNA.

[FUNCTION]: RECEIVE SPEECH.

(1) Connect RF millivoltmeter between terminal 13 and ground.

(2) Set signal generator (Rg = 50 ohms) to 8500 kHz $\pm$ 5 kHz and 30 mV (e.m.f.).

(3) Detune coil T4 by turning the core outwards.

(4) Adjust coil T1 to maximum voltmeter reading.

(5) Adjust coil T4 to minimum voltmeter reading.

(6) Disconnect RF millivoltmeter.

(7) Set signal generator to 8364 kHz ± 1 kHz and 100 µV (e.m.f.), modulated 30 %, 1000 Hz.

(8) Set [8 MHz BAND RECEIVER TUNING] to 8364 kHz.

(9) Adjust oscillatorcoil T7 until the signal is heard in the headphone. The oscillatorfrequency must be below the signal frequency, that is if the core is turned from its outmost position into the coil form, the second position is the correct one.

(10) Check that the receiver covers the band from 8260 kHz to 8820 kHz.

(11) Set the signal generator to 8500 kHz ± 5 kHz and 100 µV (e.m.f.) modulated 30%, 1000 Hz.

(12) Adjust [8 MHz BAND RECEIVER TUNING] for maximum signal in the headphone.

(13) Set [FUNCTION] to [RECEIVE MORSE.]

(14) Remove the modulation from the signal generator.

(15) Adjust BFO-coil L8 until an audio tone between 1 kHz and 2 kHz is heard in the headphone.

Typical Sensitivities:

Generator frequency	AM	Sensitivity for 15 dB S/N	Input voltages for 0.6 V AGC voltage at [TP3]	Input voltages for 3.3 V_{pp} AF voltage at [TP4]
500 kHz Rg=15Ω +150pF	30% 1000Hz	28dB/1µV	40dB/1µV	28dB/1µV
2182 kHz Rg=15Ω +150pF	30% 1000Hz	24dB/1µV	40dB/1µV	26dB/1µV
8500 kHz Rg=50Ω	30% 1000Hz	24dB/1µV	38dB/1µV	22dB/1µV
8500 kHz Rg=50Ω	0	17dB/1µV	38dB/1µV	15dB/1µV

The AF voltage is measured with [RECEIVER VOLUME] fully clockwise.

6.11. (116) Realignment of Voltage Regulator +5V

Measuring equipment:

DC voltmeter having an accuracy of 1,5% or better.

Transmitter settings:

[FREQUENCY/ANTENNA] : 500 kHz SHORT ANTENNA

[FUNCTION] : TEST

(1) Connect voltmeter between terminals 13 and 1.

(2) Adjust R10 until meter reads 5V ±0,1V.

6.12. (117) Realignment of Voltage Regulator +20V.

Measuring equipment:

DC voltmeter having an accuracy of 1,5% or better.

Transmitter settings:

[FREQUENCY/ANTENNA] . 500 kHz SHORT ANTENNA

[FUNCTION] : TEST

(1) Connect voltmeter between terminals 5 and 7.

(2) Adjust R21 until meter reads 21V ±0,1V.

6.13. Generator Unit

It is recommended not to attempt repairing the generator or the gear box. A complete unit comprising generator and gear box is available through the manufacturer's exchange service.

7.1. Numbering

An identification number between /101\ and /120\ is assigned to each module. The designation of a component or terminal includes this number as a prefix - example: 103R3 (resistor R3 on module /103\), or 103-2 (terminal No. 2 on module /103\). Components that do not belong to any module (chassis-mounted components) carry the prefix 109.

7.2. Switches

Switches with stops are shown in the extreme anticlockwise position. Switch wafer No. 1 is the wafer nearest the front panel, and the front side of a wafer is the side facing the front panel.

7.3. Terminals

Locations of terminals appear from the component location drawings and from the circuit-board location plans.

In the circuit diagrams, each terminal is identified by a number and in most cases by an explanatory text. In addition to this, the number of the module and terminal to which the lead connects are indicated (example: /104\-8). Where interconnections consist of coaxial cables, only the number of the terminal is given to which the inner conductor of the cable is connected.

7.4. Voltages

Typical DC voltages are indicated in the circuit diagrams next to the points to which they refer and are marked with a "V".

Typical AC voltages are likewise indicated in the circuit diagrams. They are marked with "Vpp" or "mVpp".

For measuring conditions see Chapter 6.

7.5. Test Points

Locations of test points appear from the component location drawings and from the circuit-board location plans.

7.6. ABBREVIATIONS

A = ampere, amperes

C = capacitor

Car. = carbon

Cer. = ceramic

D = diode

F = farad

FS = fuse

H = henry

IC = integrated circuit

k = kilo or 10^3

L = inductor

L.E.D. = light emitting diode

lin. = linear

log. = logaritmic

m = milli or 10^{-3}

M = mega or 10^6

Mi = mica

MP = metallized paper

µ = micro or 10^{-6}

n = nano or 10^{-9}

NTC = neg.temp.coefficient

p = pico or 10^{-12}

PL = connector (plug)

Polyes. = polyester

Polyst. = polystyrene

PUT = programmable unijunction transistor

PTC = pos. temp. coefficient

R = resistor

RL = relay

S = switch

SK = connector (socket)

SL = lamp

T = transformer

Tan = tantalum electrolytic capacitor

TR = transistor

V = working voltage DC

Vl... = valve

Vac. = working voltage AC

Var. = variable

Varicap = variable capacitance diode

ww = wire wound

W = watt, watts

W.alum. = wet aluminium electrolytic

X = crystal, crystal osc. or crystal filter

PARTS LIST

FOR

AUTOMATIC KEYING DEVICE



101C 1 - 3	0.1 uF	-20/+80%	12V	Cer.	601 510 00
101D 1	1S920				830 192 00
101IC 1	SN 7473 N				850 747 30
101IC 2	SN 7400 N				850 740 00
101IC 3	SN 7404 N				850 740 40
101IC 4	SN 7410 N				850 741 00
101IC 5	SN 7473 N				850 747 30
101IC 6	SN 7476 N				850 747 60
101IC7	SN 7473 N				850 747 30
101IC 8	SN 7410 N				850 741 00
101IC 9	SN 7400 N				850 740 00
101IC10	SN 7404 N				850 740 04
101IC11	SN 7400 N				850 740 00
101IC12-13	SN 7473 N				850 747 30
101IC14	SN 7420 N				850 742 00
101IC15	SN 7490 N				850 749 02
101IC16	SN 7400 N				850 740 00
101IC17	SN 7420 N				850 742 00
101IC18-19	SN 7473 N				850 747 30
101IC20	SN 7420 N				850 742 00
101IC21	SN 7400 N				850 740 00
101IC22	SN 7430 N				850 743 00
101IC23	SN 7473 N				850 747 30
101 R 1-6	1.0 kohm	5%	1/3W	Car.	501 310 00

PARTS LIST

FOR

T 1 TRANSMITTER MODULE



102C1-2	0.1 uF	-20/+80%	12V	Cer.	601 510 00
C3	1.0 uF	10%	100V	Polyes.	623 610 00
C4-5	10 nF	-20/+80%	30V	Cer.	602 410 00
C6	0.1 uF	10%	250V	Polyes.	624 510 00
C7	0.1 uF	-20/+80%	12V	Cer.	601 510 00
C8	220 pF	10%	100V	Cer.	602 222 00
C9	270 pF	10%	100V	Cer.	602 227 00
C10	220 pF	10%	100V	Cer.	602 222 00
C11	270 pF	10%	100V	Cer.	602 227 00
C12-13	220 pF	10%	100V	Cer.	602 222 00
102D1	BZX79 B9V1	Zener			832 799 10
D2-3-4	AAZ17				830 001 70
102IC1-7	SN7490				850 749 02
IC8-9	SN7400				850 740 00
102P1-5	1.0 kohms	5%	1/3W	Car.	501 310 00
R6	18 kohms	5%	1/3W	Car.	501 418 00
R7	10 kohms	5%	1/3W	Car.	501 410 00
R8	1.0 kohms	5%	1/3W	Car.	501 310 00
R9	330 ohms	5%	1/3W	Car.	501 233 00
R10	470 ohms	5%	1/3W	Car.	501 247 00
R11	1.0 kohm	5%	1/3W	Car.	501 310 00
R12	470 ohms	5%	1/3W	Car.	501 247 00
R13	1.0 kohm	5%	1/3W	Car.	501 310 00
R14	1.8 kohms	5%	1/3W	Car.	501 318 00
R15	270 ohms	5%	1/3W	Car.	501 227 00
102TR1	BC547 B				840 054 70
102X1	CRYSTAL	2182 kHz			382 070 03
X2	CPYSTAL	2000 kHz			382 070 22

PARTS LIST

FOR

T 1 TRANSMITTER MODULE



103C1	22 nF	-20/+80%	30V	Cer.	602 422 00
C2	0.22 uF	10%	250V	Polyes.	624 522 01
C4	22 uF		15V	Tan.	651 722 00
C6	100 uF		16V	W.alum.	651 810 00
C7	680 uF		40V	W.alum.	652 868 01
C9	680 uF		40V	W.alum.	652 868 01
C10-11	150 uF	1%	63V	Polyst.	612 515 00
C12	100 uF		16V	W.alum.	651 722 00
C13	470 uF		16V	W.alum.	651 847 00
C15	560 pF	$\pm$1%	500V	Polyst.	615 256 00
C16	22 pF	$\pm$5%	400V	Cer.	605 122 02
C17	820 pF	$\pm$1%	500V	Polyst.	615 282 00
103D1-2	1S 920				830 192 00
103R2-4	4.7 kohms	5%	1/3W		501 347 00
R5	1.0 kohms	5%	1/3W		501 310 00
R6	150 ohms	5%	1/3W		501 215 00
R9	100 kohms	5%	1/3W		501 510 00
R11-12	2.2 kohms	5%	1/3W		501 322 00
R13	270 ohms	5%	1/3W		501 227 00
R14	6.8 kohms	5%	1/3W		501 368 00
R15	68 kohms	5%	1/3W		501 468 00
R16	1.0 kohm	5%	1/3W		501 310 00
R17	820 ohms	5%	1/3W		615 282 00
R18-19	1.8 kohms	5%	1/3W		501 318 00
R20	560 ohms	5%	1/3W		501 256 00
R21	1.0 kohm	5%	1/3W		501 310 00
R22	56 kohms	5%	1/3W		501 456 00
R25	10 kohms	5%	1/3W		501 410 00
R26	3.9 kohms	5%	1/3W		501 339 00
R27	27 kohms	5%	1/3W		501 427 00
R28	220 ohms	5%	1/3W		501 222 00
R29	330 ohms	5%	1/3W		501 233 00
103T1	TRANSFORMER				102 007 12
T2	TRANSFORMER				102 007 22
103TR3	BC558 B				
TR4-5-6	BC547 B				
TR7-8	BC558 B				

PARTS LIST

FOR

T 1 TRANSMITTER MODULE



104C1	0.1 uF	10%	250V	Polyes.	624 510 00
C2	65 pF	5%	400V	Cer.	605 165 00
C3-4	100 pF	1%	500V	Polyes.	615 210 00
C5	22 nF	10%	250V	Polyes.	625 422 00
C6	22 nF	-20/+80%	30V	Cer.	602 422 00
C7-7-9	0.1 uF	10%	250V	Cer.	624 510 00
C10	22 uF		15V	Tan.	651 722 00
C11	0.1 uF	10%	250V	Polyes.	624 510 00
C13-14-15	0.1uF	10%	250V	Polyes	624 510 00
C16	560 pF	1%	500V	Polyst.	615 256 00
C17	1.8 nF	1%	250V	Polyst.	614 318 00
104D2	MBD 701				
104R1	470 ohms	5%	1/3W	Car.	501 247 00
R2	68 kohms	5%	1/3W	Car.	501 468 00
R3	47 kohms	5%	1/3W	Car.	501 447 00
R5	2.7 kohms	5%	1/3W	Car.	501 327 00
R6	6.8 kohms	5%	1/3W	Car.	501 368 00
R7	4.7 kohms	5%	1/3W	Car.	501 347 00
R9	56 ohms	5%	1/3W	Car.	501 156 00
R10	Individual adjust	5%	1/3W	Car.	
R11	56 ohms	5%	1/3W	Car.	501 156 00
R12-13	4.7 kohms	5%	1/3W	Car.	501 347 00
R14	15 kohms	5%	1/3W	Car.	501 415 00
R15-16	10 kohms	5%	1/3W	Car.	501 410 00
R17	1.2 kohms	5%	1/3W	Car.	501 312 00
R18	Individual adjust	5%	1/3W	Car.	
R19	100 ohms	5%	1/3W	Car.	501 210 00
R20	56 ohms	5%	1/3W	Car.	501 156 00
R21	100 ohms	5%	1/3W	Car.	501 210 00
R22-23	Individual adj.	5%	1/3W	Car.	
R26	27 ohms	5%	1/3W	Car.	501 127 00
R27	1.5 kohms	5%	1/3W	Car.	501 315 00
R28	10 ohms	5%	1/3W	Car.	501 110 00
R29	330 ohms	5%	1/3W	Car.	501 233 00
R30-31-32	10 ohms	5%	1/3W	Car.	501 110 00
R33	Individual adjust	5%	1/3W	Car.	
R35	220 ohms	5%	1/3W	Car.	501 222 00
R36	1.2 kohms	5%	1/3W	Car.	501 312 00
R37	560 ohms	5%	1/3W	Car.	501 256 00
R38	2.7 kohms	5%	1/3W	Car.	501 327 00
R39	5.6 kohms	5%	1/3W	Car.	501 356 00



104T1	TRANSFORMER		102 094 51
T2	TRANSFORMER		102 094 21
104TR1-2-3-4-5	BC547B		840 054 70
TR6	BD135-10		842 013 51
104X1	CRYSTAL	8364 kHz	382 070 13

PARTS LIST

FOR

CHASSIS (electrical parts)



109C2	0.22 uF	10%	250V	Polyes.	624 522 00
C3	0.68 uF	10%	250V	Polyes.	624 568 00
C4	1.8 nF	5%	125V	Polyst.	613 318 00
C5	82 pF	10%	1600V	Cer.	607 182 00
C6	47 pF	5%	1000V	Cer.	607 147 00
C7	910 pF	5%	125V	Polyst.	613 291 00
C8	200 pF				362 083 82
C9	250 pF	5%	1600V	Cer.	607 225 00
C10	0.1 uF	-20/+80%	12V	Cer.	601 510 00
C11	560 pF	5%	630V	Cer.	606 256 00
C12	68 pF	10%	1600V	Cer.	607 168 00
C13	910 pF	5%	630V	Cer.	606 291 00
C15-16	0.1 uF	10%	250V	Polyes.	624 510 01
C17	100 uF		160V	W.alum.	653 810 00
C18	0.1 uF	10%	250V	Polyes.	624 510 01
C19	47 pF	5%	1000V	Cer.	607 147 00
109D1-2	TIL 209				823 000 00
D7	AAZ 17				830 001 70
D9	1S 920				830 192 00
109L1	COIL				102 076 62
L2	VARIOMETER	500 kHz			992 078 64
L3	VARIOMETER	2182 kHz			992 078 83
L4	COIL				102 079 51
L5	COIL				102 071 32
L6	COIL				102 091 62
L7	FILTER CHOKE	1 mH			740 310 02
L9	COIL				104 070 94
L10	RF CHOKE	10uH 10%			740 110 00
109ME1	INSTRUMENT				873 000 01
109M1C1-TL1	MICROPHONE - HEADPHONE				992 082 84
109PL1	Plug	L1349/CP		B&L	751 000 14
PL2	Plug antenna				372 080 42

109R3	47 kohms	lin.			352 086 01
R4	47 kohms	log.			352 085 91
R5	1.0 kohm	5%	1/3W	Car.	501 310 00
R6	47 ohms	5%	4.7W	ww	526 147 00
R7	100 ohms	5%	1/3W	Car.	501 210 00
R8	27 ohms	5%	1/3W	Car.	501 127 00
R9-10	220 ohms	5%	1W	Car.	504 222 00
R11	12 ohm	5%	3/4W	Car.	503 112 00
109S1 1,2,3	ROTARY SWITCH				372 076 89
S2 1,2,3	ROTARY SWITCH				372 077 01
S3	MORSE KEY				992 087 21
S4	SWITCH START		1.01001.031 RAFI		763 000 01
109 SL1	LAMP	15mA 10V			821 000 04
109TL1-MIC1	HEADPHONE MICROPHONE				992 082 84
109TR4	2N 6111				842 611 10
TR5	BLY 92A				842 009 20
TR6	BDY 26B				842 002 60
	GENERATOR				382 089 96
	GEAR				342 084 26

PARTS LIST

FOR

RECEIVER

110

110C1	100 pF	5%	400V	Cer.	605 210 00
C2	220 pF	1%	500V	Polyst.	615 222 00
C3	5.6 pF	± 0.25pF	400V	Cer.	605 056 00
C4	1.8 pF	± 0.25pF	400V	Cer.	605 018 00
C5	2.2 nF	2%	500V	Polyst.	615 322 00
C6	100 pF	5%	400V	Cer.	605 210 00
C7	220 pF	1%	500V	Polyst.	615 222 00
C8	3.3 nF	1%	125V	Polyst.	613 333 00
C9	6.8 nF	1%	63V	Polyst	612 368 00
C10	39 pF	5%	400V	Cer.	605 139 00
C11	2.2 nF	2%	500V	Polyst.	615 322 00
C12	27 pf	5%	400V	Cer.	605 127 02
C13	2.2 nF	2%	500V	Polyst.	615 322 00
C14	33 pF	5%	400V	Cer.	605 133 00
C15	220 pF	1%	500V	Polyst.	615 222 00
C16	2.2 nF	2%	500V	Polyst.	615 322 00
C17	47 pF	5%	400V	Cer.	605 147 00
C18-19	47 nF	-20/+80%	12V	Cer.	601 447 00
C20	3.9 nF	1%	125V	Polyst.	613 339 00
C21	4.7 nF	1%	63V	Polyst.	612 347 00
C22	47 nF	-20/+80%	12V	Cer.	601 447 00
C23	82 nF	5%	400V	Cer.	605 182 00
C24	2.2 nF	1%	250V	Polyst.	614 322 00
C25	10 nF	-20/+80%	30V	Cer.	602 410 00
C26	0.1 uF	-20/+80%	12V	Cer.	601 510 00
C27	22 uF		15V	Tan.	651 722 00
C28	10 nF	-20/+80%	30V	Cer.	602 410 00
C29	2.2 nF	1%	250V	Polyst.	614 322 00
C30	22 uF		15V	Tan.	651 722 00
C31	2.2 nF	1%	250V	Polyst.	614 322 00
C32	6.8 nF	1%	63V	Polyst.	612 368 00
C33	22 uF		15V	Tan.	651 722 00
C34	0.22 uF	-20/+80%	12V	Cer.	601 522 00
C35	470 uF		16V	W.alum.	651 847 00
C36	0.1 uF	-20/+80%	12V	Cer.	601 510 00
C37	4.7 nF	-20/+80%	30V	Cer.	602 347 00
C38	0.1 uF	-20/+80%	12V	Cer.	601 510 00
110D1-8	1S920				830 192 00
D9	BB103g				833 010 30
D10-12	1S920				830 192 00
110IC1	TBA 570				850 057 00

110L1	100 uH	RF CHOKE	10%		740 210 00
L2	1 mH	RF CHOKE	10%		740 310 01
L3-7	COIL				105 071 61
L8	COIL				105 071 51
110R1	10 kohms	5%	1/3W	Car.	501 410 00
R2	27 kohms	5%	1/3W	Car.	501 427 00
R3	15 kohms	5%	1/3W	Car.	501 415 00
R4	680 ohms	5%	1/3W	Car.	501 268 00
R5	560 ohms	5%	1/3W	Car.	501 256 00
R6-7	3.3 kohms	5%	1/3W	Car.	501 333 00
R8	18 kohms	5%	1/3W	Car.	501 418 00
R9-10	4.7 kohms	5%	1/3W	Car.	501 347 00
R11	10 kohms	5%	1/3W	Car.	501 410 00
R12	100 ohms	5%	1/3W	Car.	501 210 00
R13-14	22 kohms	5%	1/3W	Car.	501 422 00
R15	100 kohms	5%	1/3W	Car.	501 510 00
R16	10 ohms	5%	1/3W	Car.	501 110 00
R17	220 ohms	5%	1/3W	Car.	501 222 00
R18-19	47 kohms	5%	1/3W	Car.	501 447 00
R20	3.3 kohms	5%	1/3W	Car.	501 333 00
R21	47 ohms	5%	1/3W	Car.	501 147 00
R22	1 kohm	5%	1/3W	Car.	501 310 00
R23	2.7 kohms	5%	1/3W	Car.	501 327 00
R24	10 kohms	5%	1/3W	Car.	501 410 00
110SL1	LAMP	A9A-C			822 000 01
110T1	TRANSFORMER				105 070 92
T2	TRANSFORMER				105 071 12
T3	TRANSFORMER				105 071 33
T4	TRANSFORMER				105 071 03
T5-6	TRANSFORMER				105 071 23
T7	TRANSFOERMER				105 071 42
110X1	CRYSTAL 2682				385 070 01

PARTS LIST

FOR

POWER MODULE



116C1	1uF	10%	100V	Polyes	623 610 00
C2	330 pF	5%	500V	Polyst.	615 233 00
C3	470 uF		16V	W.alum.	651 847 00
C4-6	0.1 uF	-20/+80%	12V	Cer.	601 510 00
C7	100 uF		25V	W.alum.	652 810 00
116D1	IN 5401				831 540 10
D2	BZX79 B9V1	Zener			832 799 10
D3	388A				830 011 40
116IC1	LM723CN				850 072 30
116L1	25 uH	10%		RF CHOKE	740 125 00
116R1	2.7 kohms	5%	1/3W	Car.	501 327 00
R2	68 ohms	5%	1/3W	Car.	501 168 00
R3	2.2 kohms	5%	1/3W	Car.	501 322 00
R4	470 ohms	5%	1 3W	Car.	501 247 00
R5	4.7 kohms	5%	1/3W	Car.	501 347 00
R6	2.2 kohms	5%	1/3W	Car.	501 322 00
R7	4.7 kohms	5%	1/3W	Car.	501 347 00
R8	27 kohms	5%	1/3W	Car.	501 427 00
R9	68 ohms	5%	1/3W	Car.	501 168 00
R10	10 kohms	5%	1/3W	Car.	583 410 00
R11	180 ohms	5%	1/3W	Car.	501 218 00
R12	3.9 kohms	5%	1/3W	Car.	501 339 00
R13	1.0 kohm	5%	1 3W	Car.	501 310 00
116TR1	BC 557B				840 055 70
TR2	BDY 55				842 005 50
TR3-5	BC 547B				840 054 70

PARTS LIST

FOR

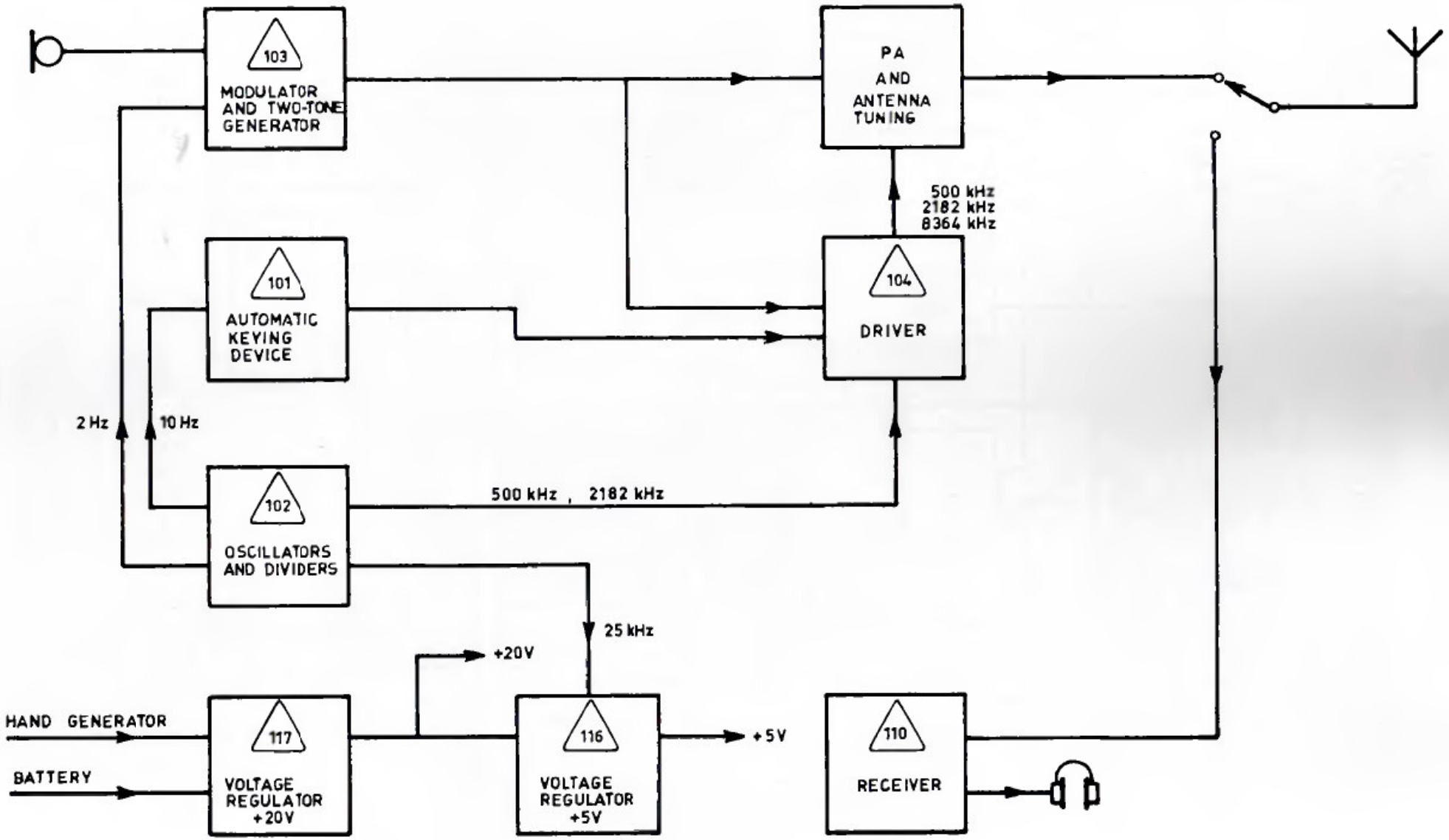
POWER MODULE



117C1-6	4.7 nF		-20/80%	400V	Cer.	605 347 00
C7	10 nF		10%	250V	Polyes.	624 410 00
C10	10 nF		10%	250V	Polyes.	624 410 00
C13	680 uF			25V	W.alum.	652 868 00
C17	0.1 uF		10%	250V	Polyes.	624 510 00
C18	10 nF		10%	250V	Polyes.	624 410 00
C19	68 nF		10%	100V	Polyes.	623 468 00
C20	470 uF			16V	W.alum.	651 847 00
117D1-2-3	10D4					831 010 40
D4	1N5401					831 540 10
D5-6-7	10D4					831 010 40
D8	A114D					830 011 41
D9	1S920					830 192 00
D11	1S920					830 192 00
D12	BZX79C	5V1	Zener			832 795 10
D13	BZX79C	4V7	Zener			832 794 70
117L1-2	25 uH/3A		RF CHOKE			740 125 00
117R1	0.5 ohm		10%	3W	ww	526 005 00
R2	270 ohms		5%	1/3W	Car.	501 227 00
R4	470 ohms		5%	1/2W	Car.	502 247 00
R5	150 ohms		5%	1/3W	Car.	501 215 00
R7	33 ohms		5%	1/3W	Car.	501 133 00
R8	680 ohms		5%	1/3W	Car.	501 268 00
R10	27 ohms		5%	1/3W	Car.	501 127 00
R11	1.2 kohm		5%	1/3W	Car.	501 312 00
R15	5.6 kohms		5%	1/3W	Car.	501 356 00
R20	2.2 kohms		5%	1/3W	Car.	501 322 00
R21	250 ohms		HC10			582 225 00
R22	680 ohms		5%	1/3W	Car.	501 268 00
R23	6.8 kohms		5%	7W	ww	527 368 00
R24	680 ohms		5%	1/3W	Car.	501 268 00
R25	5.6 kohms		5%	1/3W	Car.	501 356 00
R26	5.6 kohms		5%	1/3W	Car.	501 356 00
R27	1.2 kohms		5%	1/3W	Car.	501 312 00
R28	1.2 kohms		5%	1/3W	Car.	501 312 00
R29	390 ohms		5%	1/3W	Car.	501 239 00
R30	1.2 kohms		5%	1/3W	Car.	501 312 00

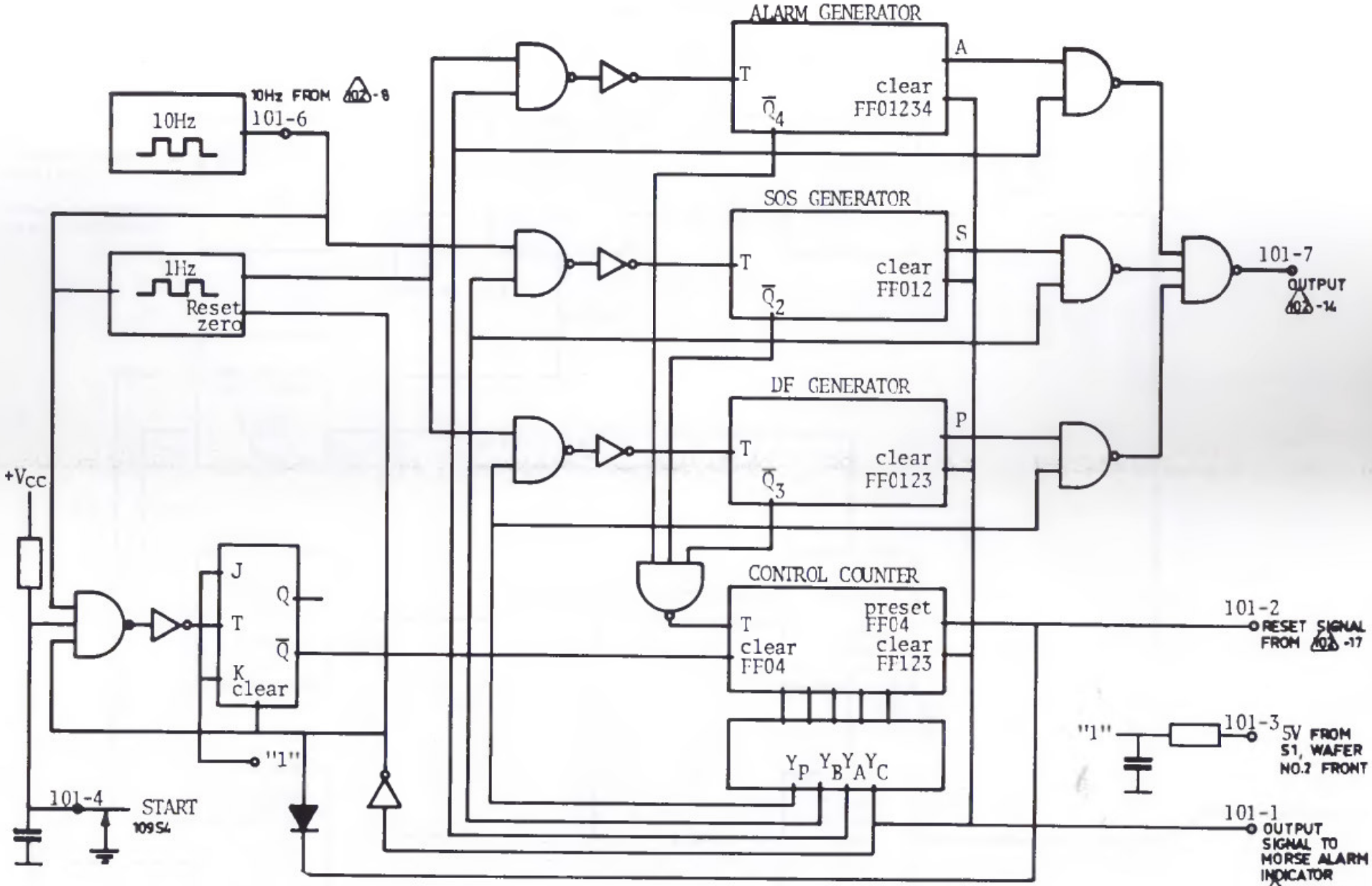


117R31	10 kohms	5%	1/3W	Car	501 410 00
R32	2.2 kohms	5%	1/3W	Car.	501 322 00
R33	220 ohms	5%	1W	Car.	504 222 00
117TR1	2N5415				841 541 50
TR2	40412				842 404 12
TR3-4-6-7	BC547B				840 054 70



992 075 41

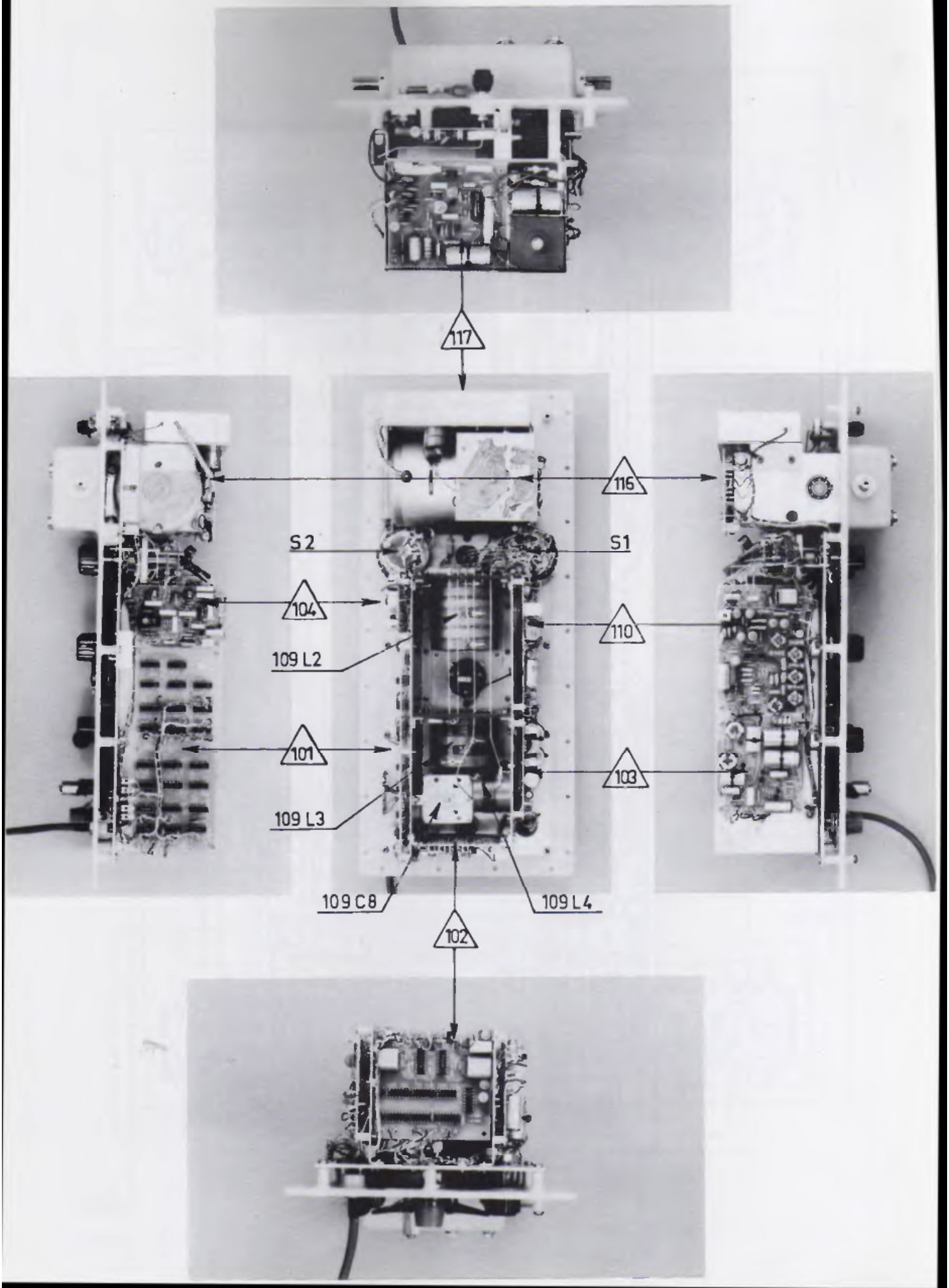
BLOCK DIAGRAM TRP 1

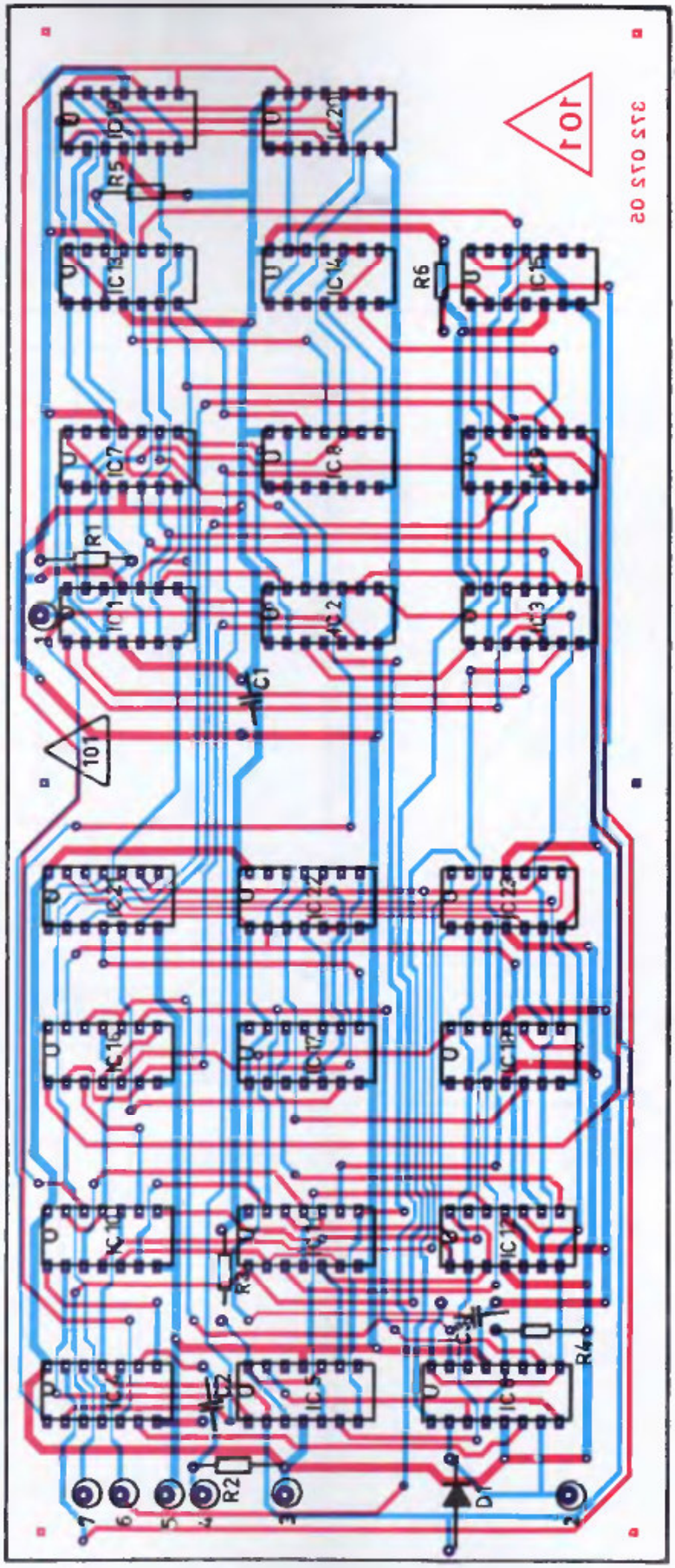


992 075 32 BLOCK DIAGRAM

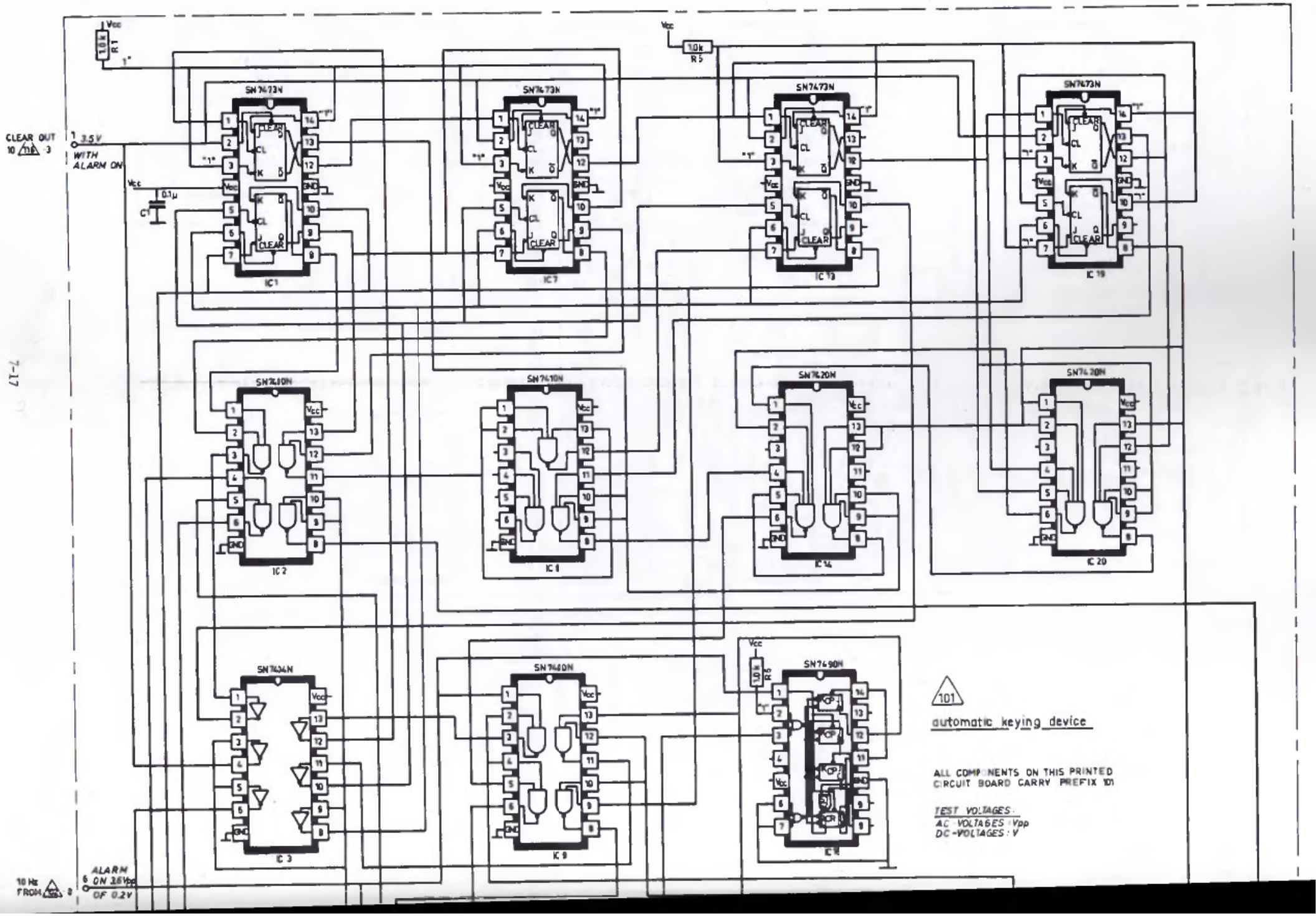
T1 TRANSMITTER MODULE 101

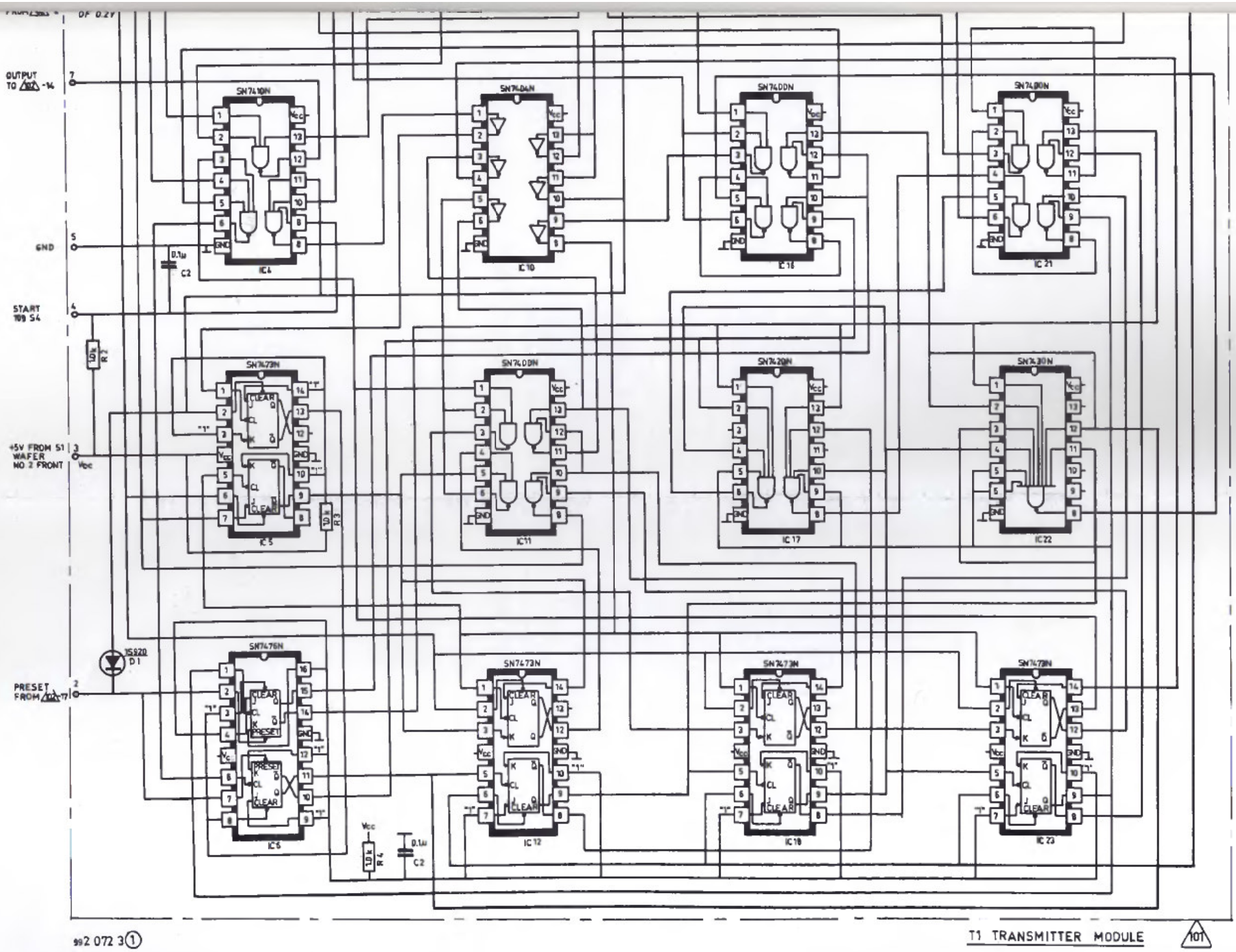
CIRCUIT BOARD LOCATION PLAN





PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE

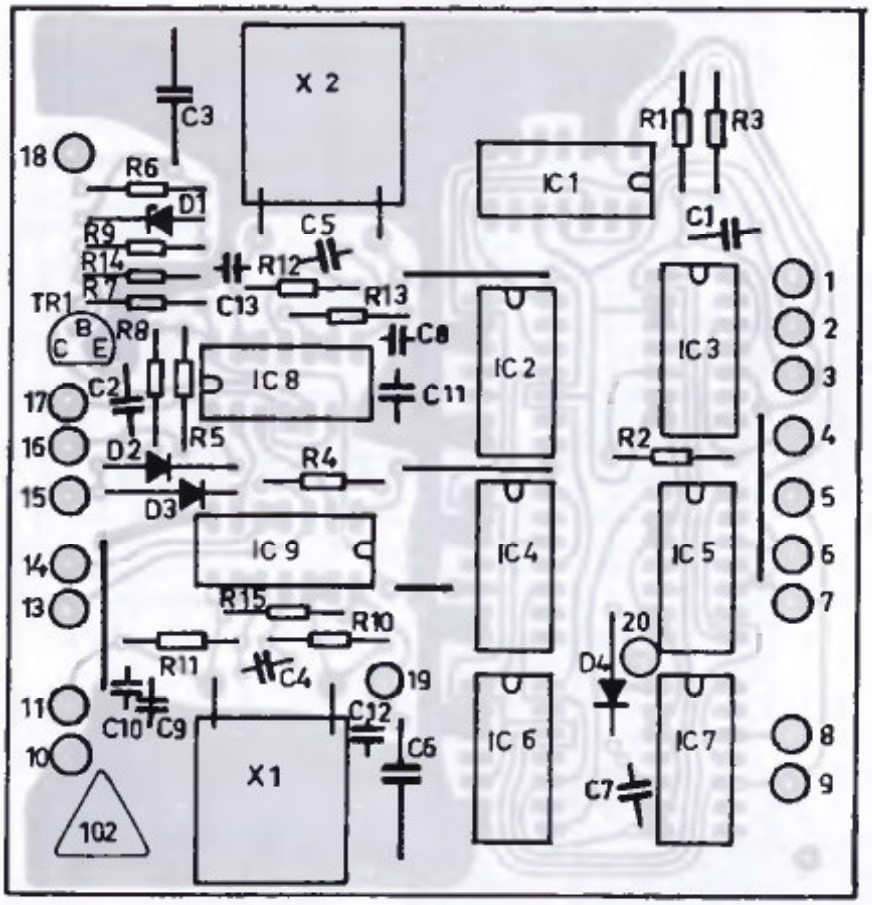

CLEAR OUT
10 (16) 3
3.5 V
WITH
ALARM ON
ALARM
6 ON 3.6 Vpp
OF 0.2 V
10 Hz
FROM (5) 8
Vcc
1.0k
R1
R5
0.1µ
C1
SN7473N
IC1
IC7
IC 13
IC 19
SN7410N
IC 2
IC 8
IC 14
IC 20
SN7404N
IC 3
SN7440N
IC 9
SN7490N
IC 15
101
automatic keying device
ALL COMPONENTS ON THIS PRINTED
CIRCUIT BOARD CARRY PREFIX 101
TEST VOLTAGES:
AC-VOLTAGES: Vpp
DC-VOLTAGES: V



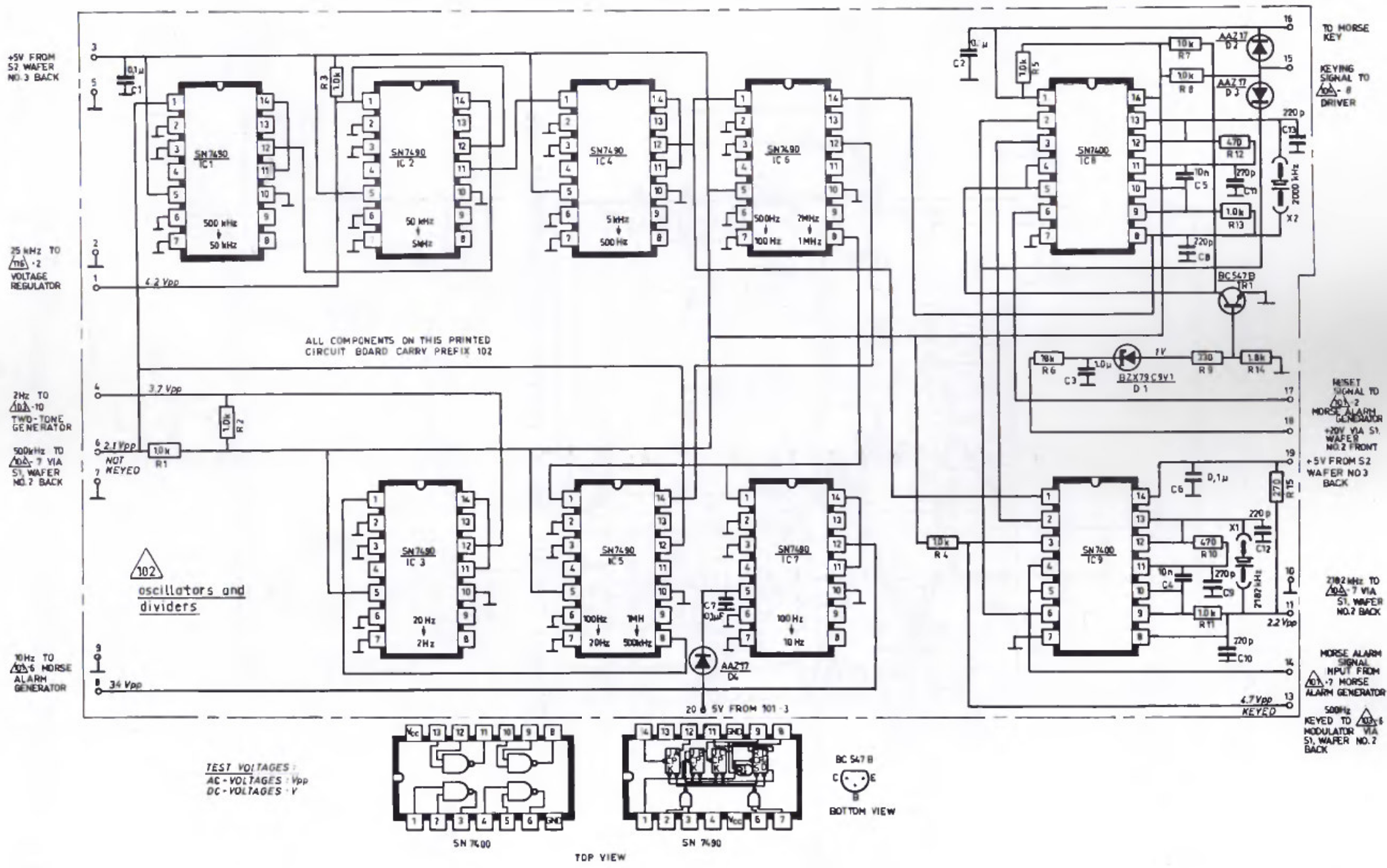
992 072 3 (1)

T1 TRANSMITTER MODULE

101

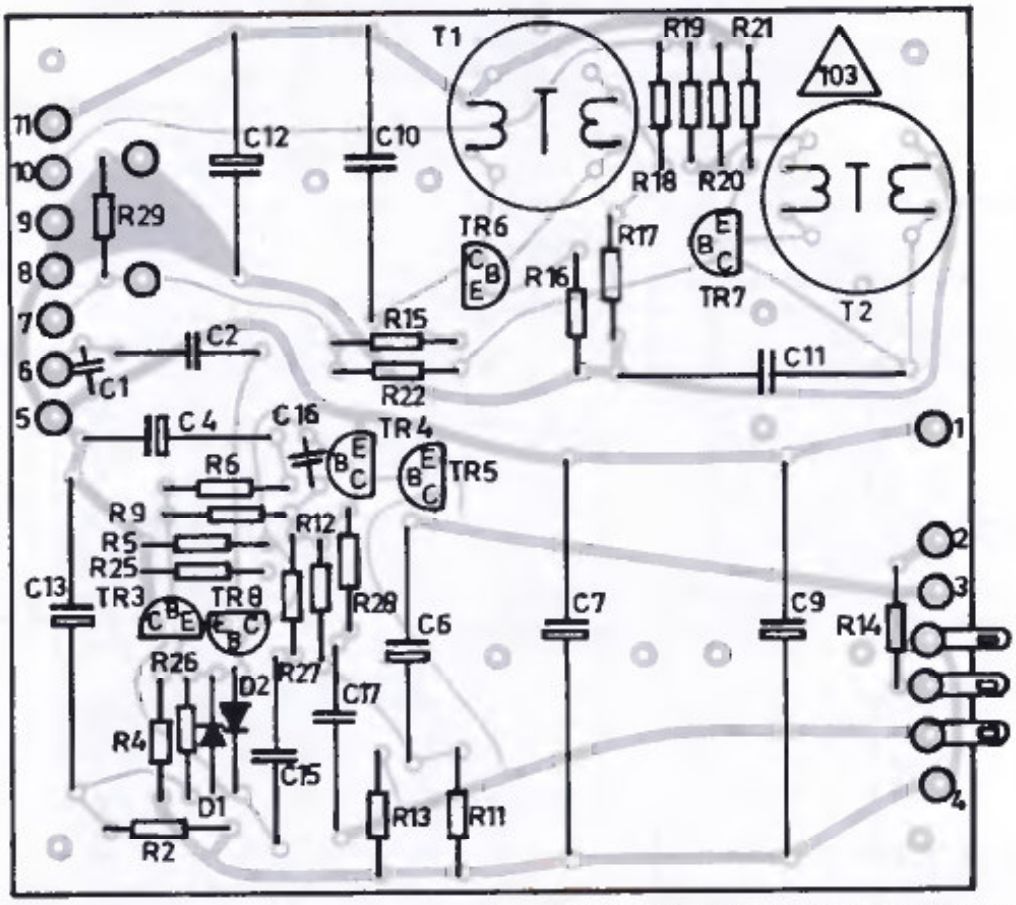


PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE

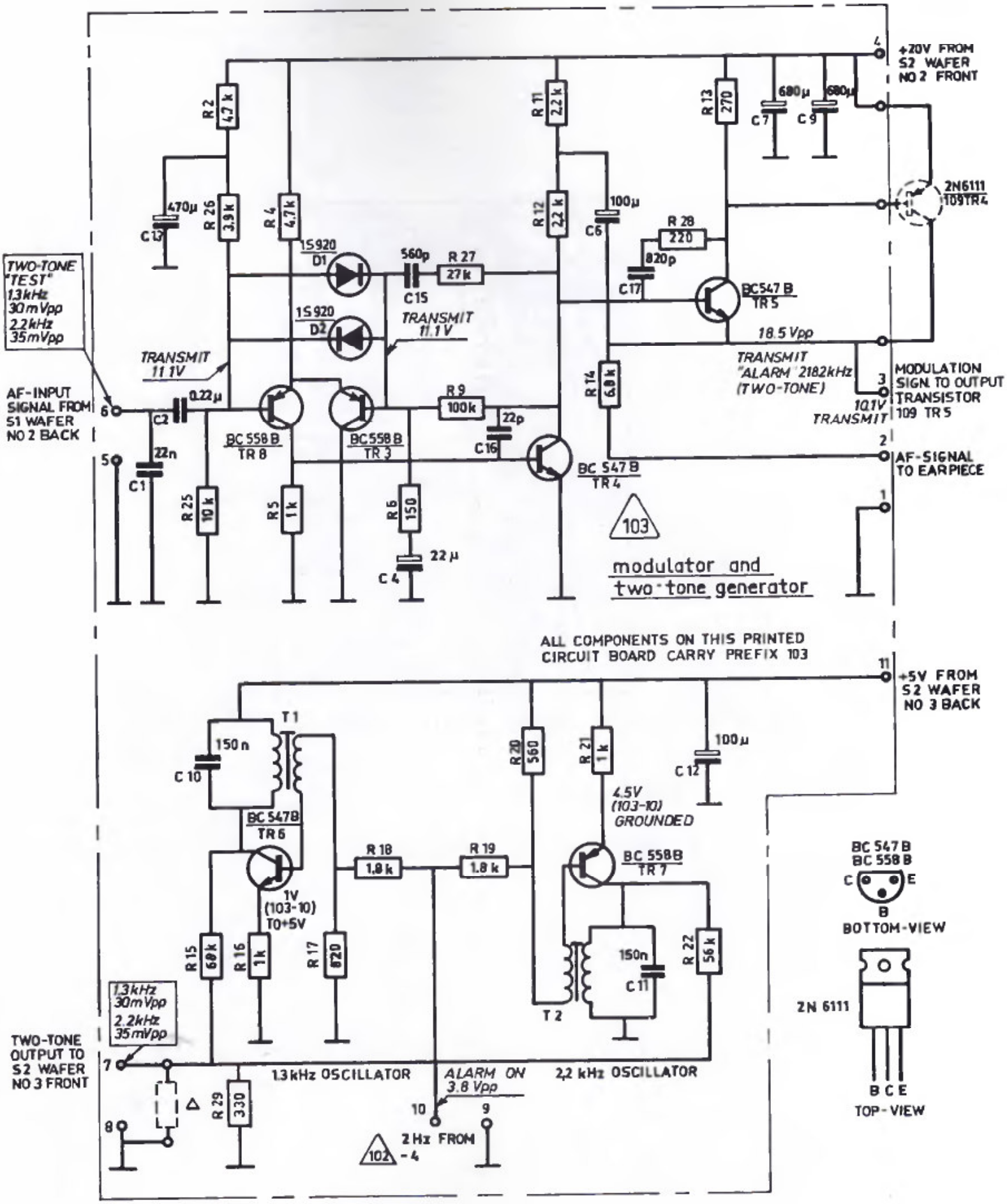


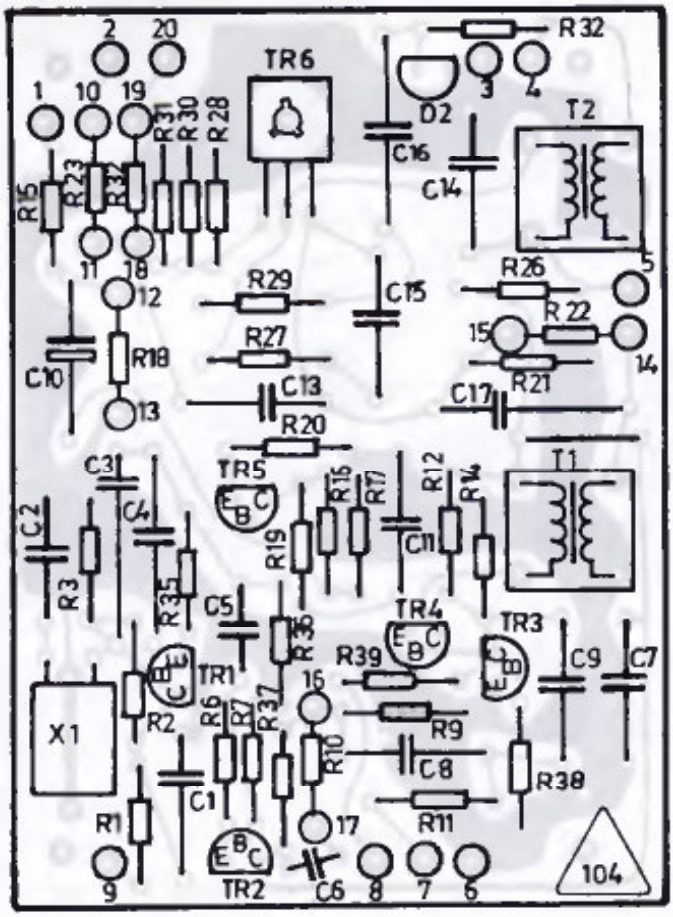
T1 TRANSMITTER MODULE

102

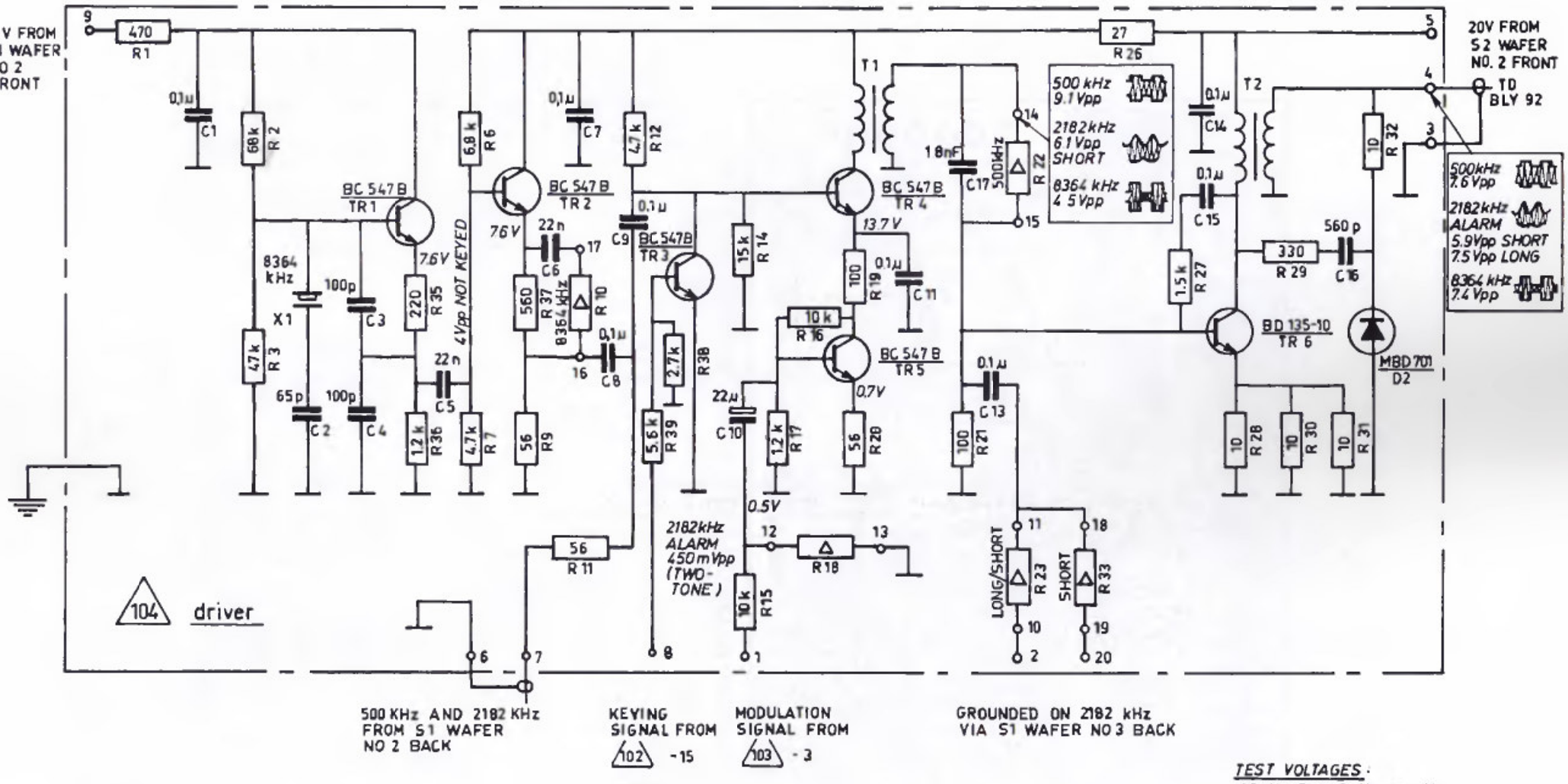


PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE


+20V FROM S2 WAFER NO 2 FRONT
2N6111 109TR4
TWO-TONE "TEST" 1.3kHz 30mVpp 2.2kHz 35mVpp
AF-INPUT SIGNAL FROM S1 WAFER NO 2 BACK
TRANSMIT 11.1V
TRANSMIT 11.1V
BC 558 B TR 8
BC 558 B TR 3
BC 547 B TR 4
BC 547 B TR 5
18.5 Vpp
TRANSMIT "ALARM" 2182kHz (TWO-TONE)
MODULATION SIGN. TO OUTPUT TRANSISTOR 109 TR 5
10.1V TRANSMIT
AF-SIGNAL TO EARPIECE
modulator and two-tone generator
ALL COMPONENTS ON THIS PRINTED CIRCUIT BOARD CARRY PREFIX 103
+5V FROM S2 WAFER NO 3 BACK
BC 547 B TR 6
BC 558 B TR 7
4.5V (103-10) GROUNDED
1V (103-10) TO+5V
BC 547 B
BC 558 B
BOTTOM-VIEW
ZN 6111
TOP-VIEW
TWO-TONE OUTPUT TO S2 WAFER NO 3 FRONT
1.3kHz 30mVpp 2.2kHz 35mVpp
1.3kHz OSCILLATOR
2,2 kHz OSCILLATOR
ALARM ON 3.8 Vpp
2Hz FROM 102 -4
△ INDIVIDUAL ADJUSTMENT
TEST VOLTAGES :
AC-VOLTAGES : Vpp or mVpp
DC-VOLTAGES : V
T1 TRANSMITTER MODULE
103
992 073 1 (3)

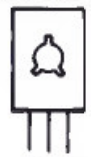


PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE



TEST VOLTAGES:
AC-VOLTAGES: Vpp or mVpp
DC-VOLTAGES: V
ANTENNA: DUMMY

BD 135-10



TOP VIEW

BC 547B

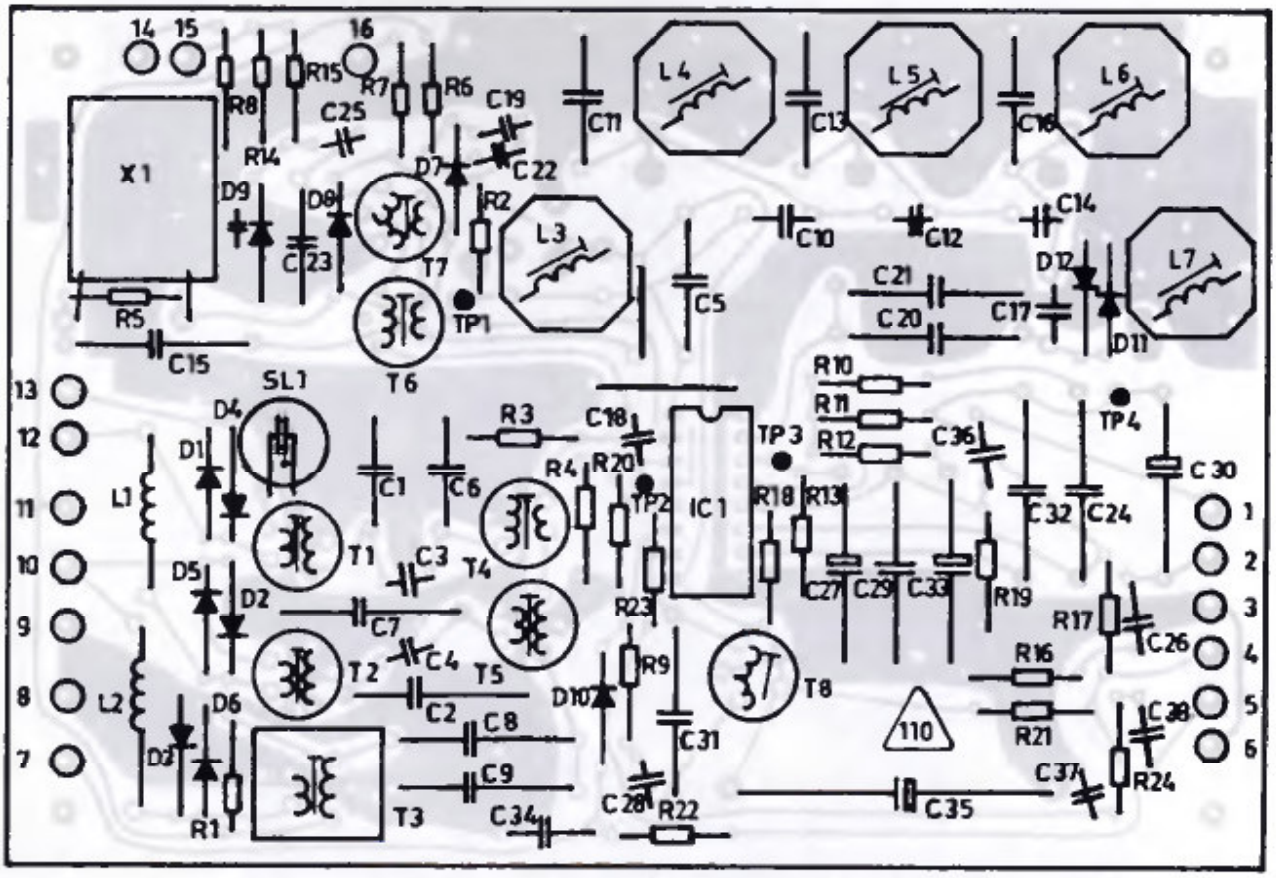


BOTTOM VIEW

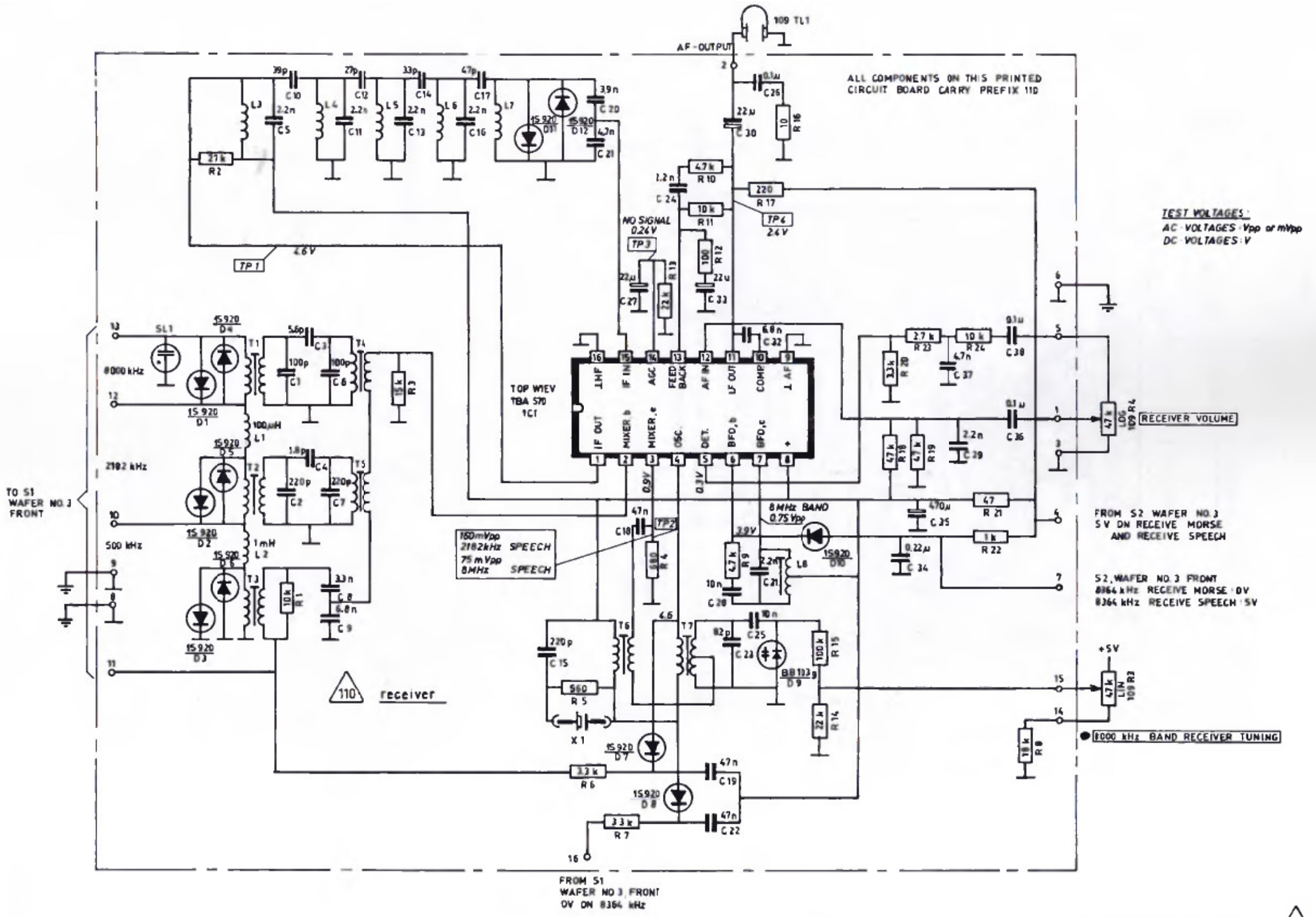
MBD 701



Δ = INDIVIDUAL ADJUSTMENT

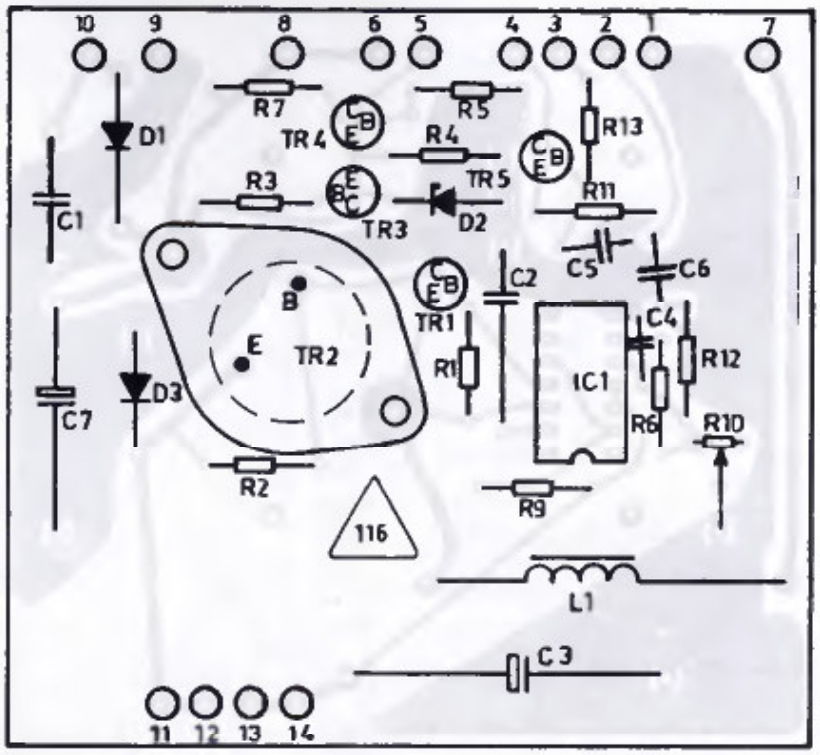


PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE.

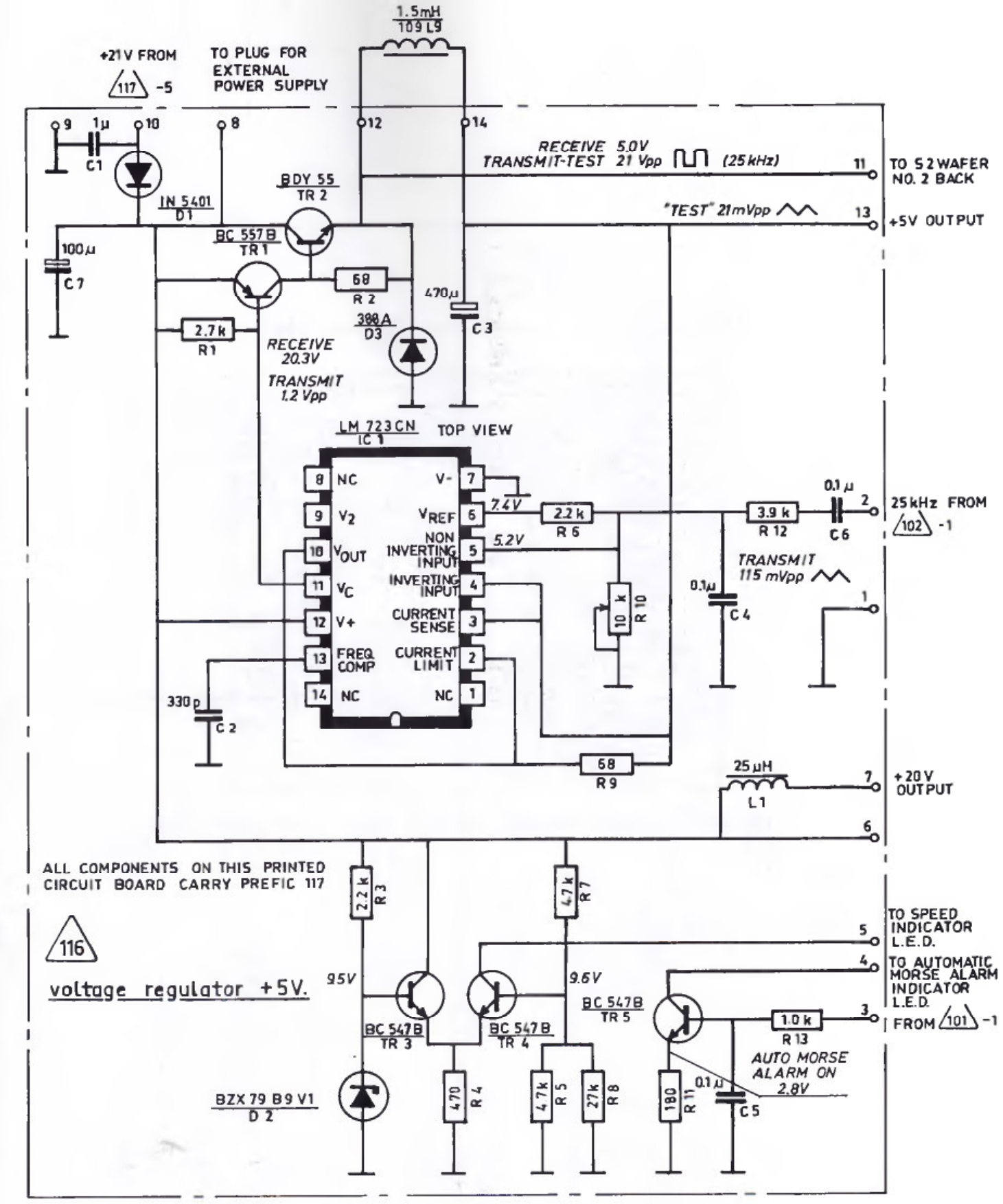


R1 RECEIVER MODULE

110



PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE



TEST VOLTAGES :

AC - VOLTAGES : Vpp or mVpp

DC - VOLTAGES : V

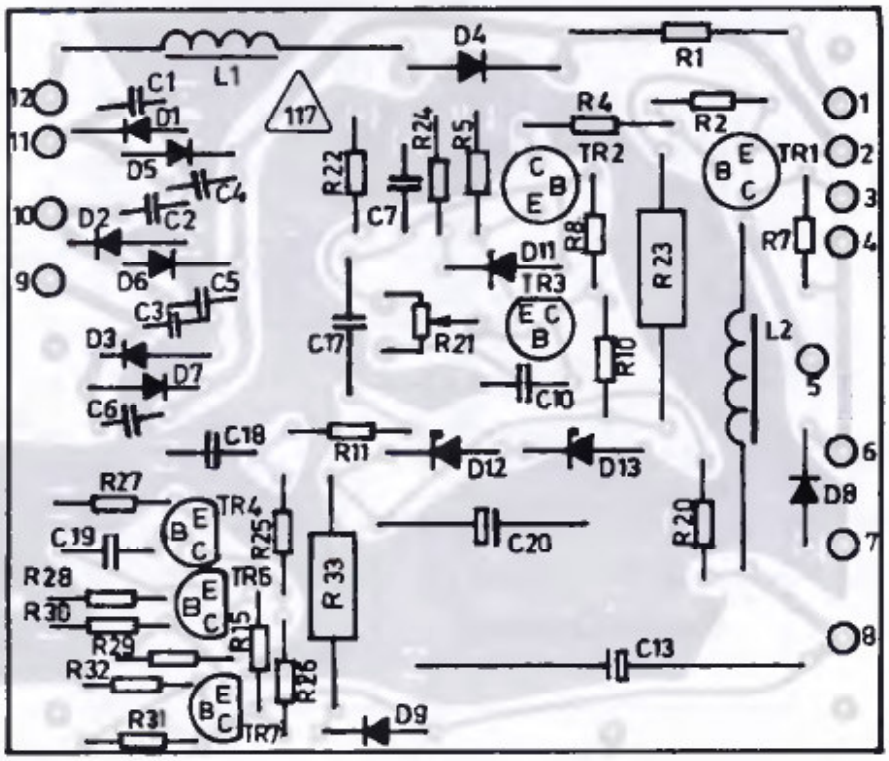
BC 547B
BC 557B



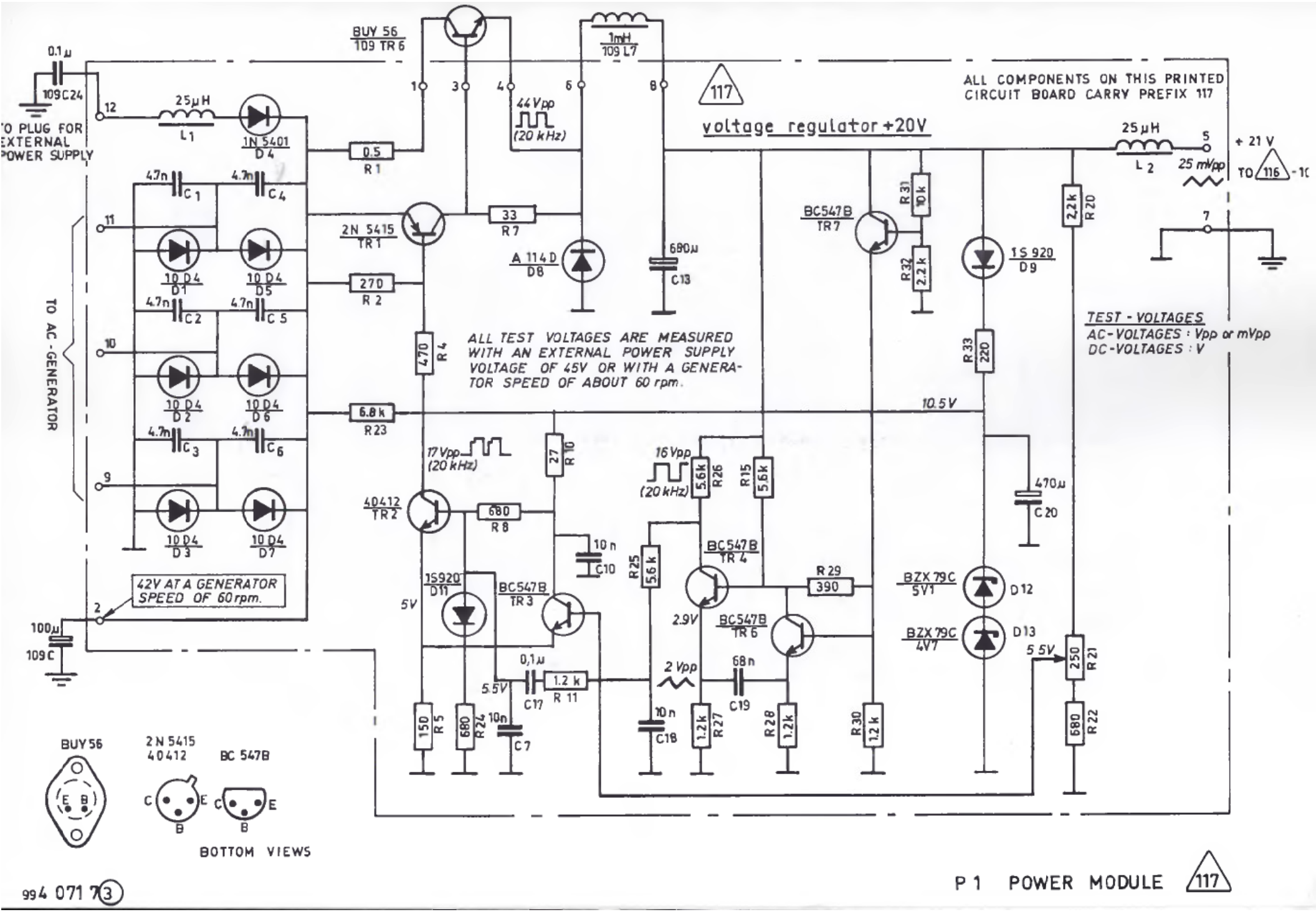
BOTTOM VIEWS

BDY 55

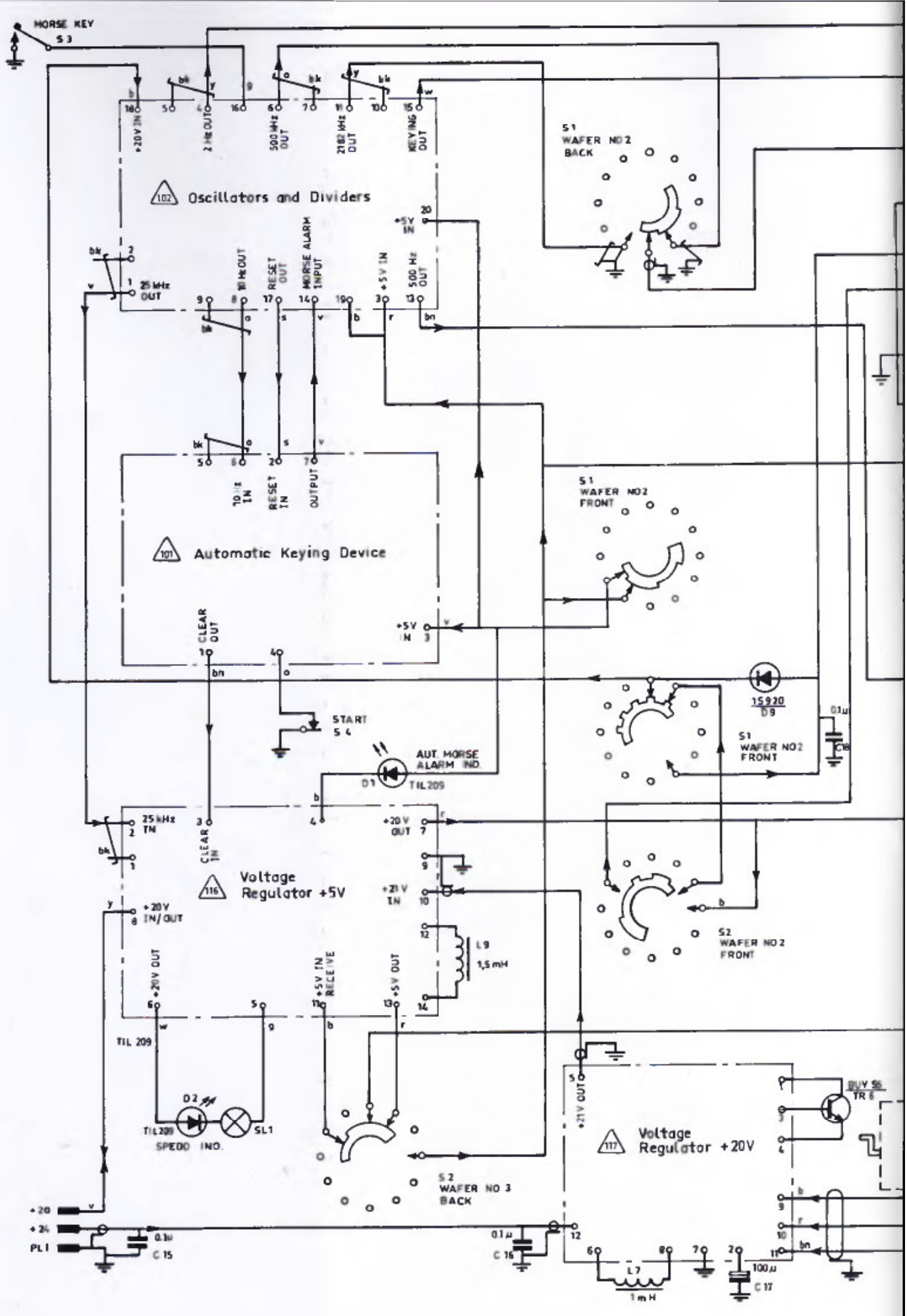




PRINTED CIRCUIT BOARD VIEWED FROM COMPONENT SIDE



P 1 POWER MODULE 117


MORSE KEY
S 3
+20V IN
2 Hz OUT
500 kHz OUT
2182 kHz OUT
KEYING OUT
102 Oscillators and Dividers
S1 WAFER NO 2 BACK
+5V IN
25 kHz OUT
10 Hz OUT
RESET OUT
MORSE ALARM INPUT
+5V IN
500 Hz OUT
10 Hz IN
RESET IN
OUTPUT
101 Automatic Keying Device
S1 WAFER NO 2 FRONT
CLEAR OUT
+5V IN
START S 4
AUT. MORSE ALARM IND.
D1 TIL 209
15920 D9
0,1µ C16
S1 WAFER NO 2 FRONT
25 kHz IN
CLEAR IN
116 Voltage Regulator +5V
+20V OUT
+21V IN
+20V IN/OUT
L9 1,5 mH
S2 WAFER NO 2 FRONT
+20V OUT
+5V IN RECEIVE
+5V OUT
TIL 209
D2
TIL 209 SPEED IND.
SL1
+21V OUT
117 Voltage Regulator +20V
BUY 56 TR 6
S2 WAFER NO 3 BACK
+20
+24
PL1
0,1µ C15
0,1µ C16
L7 1 mH
100µ C17



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